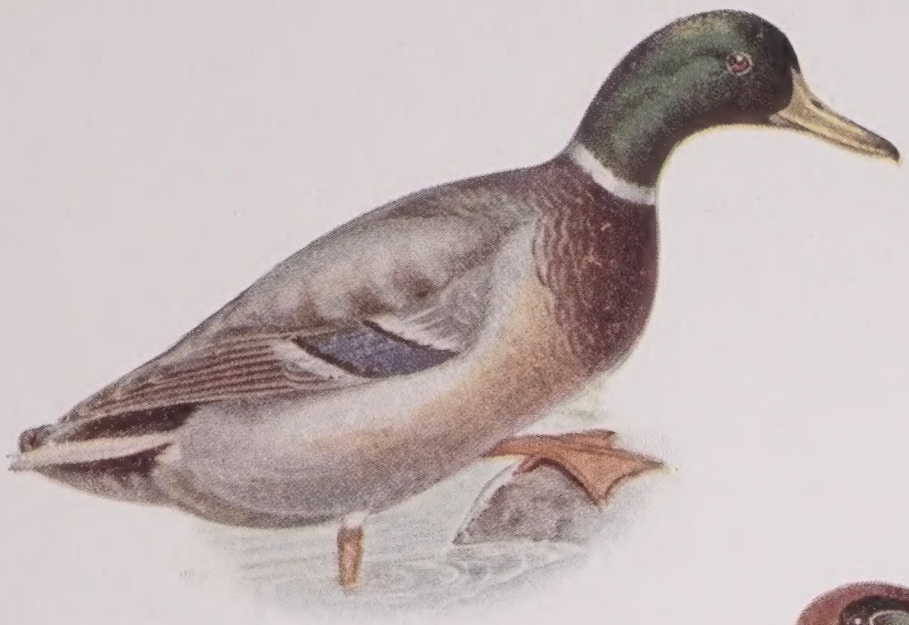
THE LIBRARY OF CONGRESS



Mallard Duck (Anas Boschas)

American Golden Plover (Charadrius Dominicus

Green-Winged Teal (Anas Carolinensis)

Woodcock (Philohela Minor)

Greater Yell

Spruce Grouse (Derdragapus Canadensis)

Blue-Winged Teal (Anas Discors)

Canvasback Duck (Aythya Vallisneria)

Ring-Necked Pheasant (Phasianus Torquatus)

Wood Duck (Aix Sponsa)

Wilson's Snipe (Gallinago Media)

gs Snipe (Totanus Melanoleucus)

Ruffed Grouse (Bonasa Umbellus)

Quail (Colinus Virginianus)

King Rail (Rallus Elegans)

THE STANDARD AMERICAN ENCYCLOPEDIA

A Dictionary of Universal Knowledge in eight volumes—Fully illustrated

VOLUME IV

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THE STANDARD AMERICAN ENCYCLOPEDIA

IN EIGHT VOLUMES—FULLY ILLUSTRATED

Volume IV

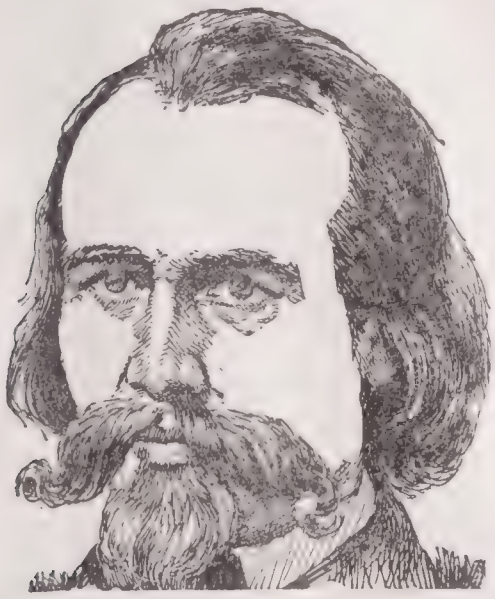
GEHLENITE—LAKHNAUTI

Gehlenite (named by Fuchs after his colleague Gehlen); a grayish-green or brown tetragonal mineral; hardness 5.5 to 6; specific gravity 2.9 to 3.1; luster resinous or vitreous; fracture uneven to splintery. Composition: Silica 29.9; alumina 21.5; sesquioxide of iron 6.6; lime 42.0 = 100. It has feeble double refraction. It is known native only in the Fassa valley, but occurs among the scoriæ of furnaces.

Gehrt (gārt), **Karl,** a German artist; born in Hamburg, Germany, May 11, 1853; studied under Karl Gussow and Albert Baur. His best works include drawings illustrating "Reinecke Fuchs"; "Tannhaüser"; "Thomas à Kempis"; etc.; the water colors "Petruchio's Wedding"; "The Pirate Claus Stortebeck"; etc. His greatest work was the wall decoration showing the history of art on the stairway of the art gallery in Düsseldorf. He died in Enderich, Germany, July 17, 1898.

Geib (gīp), **Karl Gustav,** a German criminologist, born at Lambsheim, Bavaria, 1808. His "History of Roman Criminal Law to the Death of Justinian" had great influence in Germany, though now superseded. He died in 1864.

Geibel, Emanuel von (gī′bel), one of the most popular of modern German poets; born in Lübeck, Germany, Oct. 17, 1815. After his studies at Bonn he lived at Berlin, in the poetical circle of Chamisso, Gaudy, and Kugler; next went to Athens in 1838 as tutor in the family of the Russian ambassador, but returned to Lübeck two years later. At the beginning of 1843 a pension of 300 thalers was bestowed on him by the King of Prussia. Geibel now resided alternately at St. Goar with Freiligrath, at Stuttgart, Hanover, Berlin, and Lübeck, till in 1852 he was appointed Professor of Æsthetics in the University of Munich by the King of Bavaria — a post he retained till 1868, when he retired to Lübeck. He contributed translations from the Greek poets to the "Classical Studies" of Ernst Curtius (1840), and in the same year published his own "Poems" (100th ed. 1884), the beauty and religious tone of which made them at once great favorites with the Germans. The results of his Spanish studies were the "Spanish Popular Songs and Romances" (1843), which were followed by the "Spanish Song-Book" (1852), published in conjunction with Paul Heyse. In 1857 appeared his tragedy of "Brunehild," and in 1864 his "Poems and Thought-Leaves." In 1868 he published another tragedy called "Sophonisbe." He died in Lübeck, April 6, 1884.



EMANUEL VON GEIBEL.

Geiger, Abraham (gī′ger), a German Orientalist; born in Frankfort-on-the-Main, Prussia, May 24, 1810. He went to the gymnasium, next to the universities of Heidelberg and Bonn, devoting himself to philosophy and the Oriental languages. His prize essay, "What Does Mohammed Owe to Judaism?" was published in 1833. In November, 1832, he was called as rabbi to Wiesbaden, and there he devoted himself with great zeal and in a scientific spirit to Jewish theology, especially in its relation to practical life. In 1835 he joined with several able scholars in starting the "Journal of Jewish Theology." In 1838 he was called as second rabbi to Breslau, and here he came into serious conflict with the more conservative Jews, but carried with him all men of learning and thought. From 1863 he officiated as rabbi at Frankfort, whence he was called in 1870 to Berlin. He wrote: "Original Text and Translations of the Bible" (1857); "Judaism and its History" (1864–1865); "General Introduction"; "Posthumous Works" (1875). He died in Berlin, Oct. 23, 1874.

Geiger, Lazarus, a German philologist; born in Frankfort-on-the-Main, Prussia, May 21, 1829. He studied at Bonn. Heidelberg and Würzburg, and in 1861 became a teacher in the Jewish school at Frankfort. He wrote much on the relation of language and thought, affirming that without language man must have been without reason. His principal works are "Language and Reason" (1868–1872), and "Origin of Language" (1869; 2d edition, 1878). He died in Frankfort-on-the-Main, Aug. 29, 1870.

Geijer, Erik Gustaf (yī′er), a Swedish historian; born in the province of Wermland, Jan. 12, 1783. At 20 he won a prize from the Swedish Academy for a eulogy of the great mediæval regent Sten Sture, and at 27 became Professor of History at the University of Upsala. He sat in the national Parliament for some years, and was distinguished for his eloquence. His "History of the Swedish People," "History of the State of Sweden from 1718 to 1772," and various contributions to the history of philosophy, theology, and æsthetics, are epoch-making in Swedish letters. He had considerable musical talent, and many of his compositions have become favorite songs in Sweden. He died in Stockholm, April 23, 1847.

Geikie, Sir Archibald (gē′ki), a Scottish geologist; born in Edinburgh, Scotland,

Dec. 28, 1835. He was educated at the high school and university. In 1855 he was appointed to the Geological Survey; in 1867 became director to the survey in Scotland; from 1870 to 1881 was Murchison Professor of Geology in Edinburgh University; and in 1881 was appointed director-general to the survey of the United Kingdom, being at the same time placed at the head of the Museum of Practical Geology, London. He is the author of "Story of a Boulder" (1858); "Phenomena of the Glacial Drift of Scotland" (1863); "The Scenery of Scotland Viewed in Connection with its Physical Geology" (1865; 2d ed. 1887); "Memoir of Sir R. Murchison" (1874); "Text-book of Geology" (1882); "The Founders of Geology" (1897); "Types of Scenery" (1898); etc., besides numerous class-books, primers, etc., on geology.

Geikie, James, a Scottish geologist; born in Edinburgh, Scotland, Aug. 23, 1839. He received an education similar to that of his brother Archibald. Having served on the Geological Survey of Scotland from 1861 to 1882, he succeeded his brother as Murchison Professor of Geology in Edinburgh University. He is the author of "The Great Ice Age" (2d ed. 1877); "Prehistoric Europe" (1881); "Outlines of Geology" (1886; 2d edition 1888); a translation of "Songs and Lyrics by H. Heine and other German Poets" (1887); "Earth Sculpture" (1898); etc., besides a large number of geological maps, sections and memoirs published by the Geological Survey.

Geiler von Kaisersberg, Johannes (gī'ler fon ki-zers-berg), a famous German pulpit-orator; born in Schaffhausen, Switzerland, March 16, 1455. He studied at Freiburg and Basel, and in 1478 became preacher in the cathedral of Strasburg. He was one of the most learned and original men of his age; his sermons, usually composed in Latin and delivered in German, are marked by great eloquence and earnestness, nor do they disdain the aids of wit, sarcasm, and ridicule. He died in Strasburg, March 10, 1510.

Geiregat, Pieter (gī-rā-gädt'), a Flemish novelist and dramatist; born in Ghent, Feb. 25, 1828. He began as a journalist, but soon became known as a writer of sketches and stories and plays of realistic and spectacular character. His best fictions are: "The Workman's Life" and "Folk Voices." He is happy in delineating the national character, and successful also as a historical novelist. Among the most widely known of his plays are: "Mother Rosa"; "Egmont"; and "The Two Sisters."

Geissler, Heinrich (gīs'ler), a German mechanician; born in Igelshieb, Germany, May 26, 1814. He became known as a maker of physical and chemical apparatus and principally as the inventor of GEISSLER'S TUBES (*q. v.*), an apparatus for producing light by an electric discharge in vacuo. He died in Bonn, Prussia, Jan. 24, 1879.

Geissler's Tubes, tubes made of very hard glass, and containing highly rarefied gases. Each end of the tube has a platinum wire sealed into it to serve as electrodes. When a discharge of electricity is caused to take place in these tubes by connecting the electrodes to the terminals of a Ruhmkorff's coil or a Holtz's machine, very brilliant effects may be produced.

Gela (jē'lä), one of the most important ancient Greek cities of Sicily, situated on the S. coast of the island between Agrigentum and Camarina; founded in 690 B. C. by a colony of Cretans and Rhodians. The colony was remarkably prosperous, and in 528 B. C. sent out a portion of its inhabitants, who founded Agrigentum. In 280 Phintias, the tyrant of Agrigentum, utterly destroyed Gela.

Gelada (gĕl'a-da), a singular Abyssinian baboon, remarkable for the heavy mane which hangs over the shoulders, and which only grows when the animal is adult. It is called *G. Ruppelii,* in honor of Dr. Ruppell, its discoverer.

Gelasius (jē-lā'si-us) **I.,** Bishop of Rome (492–496). An African by birth, he was one of the earliest bishops of Rome to assert the supremacy of the papal chair. He vigorously repressed Pelagianism, which was spreading in Dalmatia, renewed the ban of his predecessor, Felix III., against the Oriental patriarch, drove out the Manichæans from Rome, wrote "On the Two Natures in Christ," against the Eutychians and Nestorians, etc., and died in 496.

Gelasius II., Bishop of Rome (1118–1119), formerly John of Gaeta. He was educated at the Benedictine abbey of Monte Cassino, was cardinal and chancellor under Urban II. and Paschal II., and on the death of the latter was chosen Pope by the party hostile to the Emperor Henry V. The imperial party at Rome under the Frangipani seized his person, but were forced to set him free by the menacing attitude of the mob. The new Pope fled before the advancing imperial troops to Gaeta, where he first received his consecration, and whence he fulminated the thunders of excommunication against Henry V. and Gregory VIII., the antipope he had set up. Soon after he was able to return to Rome, but ere long had to betake himself for protection to France, where he died in the monastery of Clugny, Jan. 29, 1119.

Gelatine, or **Gelatin** (Latin, *gelatus* = frozen, so named from the tendency which the substance has to congeal and become to a certain extent solid), in chemistry,

$C_{75}H_{124}N_{24}O_{29}$.? Animal glutin, obtained by treating bones with dilute hydrochloric acid, which dissolves the mineral constituents of the bone, consisting of phosphates and carbonates of calcium, magnesium, etc., and leaves the bone cartilage. This, when boiled for a long time with water, dissolves, and forms gelatine, which can be purified by dissolving in hot water and precipitating by alcohol. A pure variety is obtained from the swimming bladder of the sturgeon or other species of *Acipenser*. Impure gelatine, called glue, is prepared by boiling down pieces of hide, horn, hoof, cartilage, etc., with water under pressure. Pure gelatine is amorphous, transparent in thin plates, of a yellowish-white color; it has neither taste nor smell, and is neutral to vegetable colors; it is insoluble in alcohol and in ether. In contact with cold water it swells up, and is soluble in hot water. It is not precipitated by acids, except by tannic acid, which gives a flaky precipitate which is insoluble in water, alcohol, and ether; this reaction takes place in the formation of leather. The aqueous solution of gelatine turns the plane of polarization to the left. Gelatine subjected to dry distillation yields methylamine, cyanide of ammonium, pyrrol, etc.; by oxidation with sulphuric acid and manganese dioxide, or with chromic acid mixture, it yields hydrocyanic acid, acids of the fatty series, benzoic aldehyde and benzoic acid, etc. Gelatine boiled with caustic potash yields glycocine and leucine. Gelatine contains about 50 per cent. of carbon, 6.6 of hydrogen, and 18.4 of nitrogen; when pure it probably contains no sulphur. Moist gelatine exposed to the air rapidly putrefies, the liquid becoming first acid, but afterward it gives off ammonia. Dry gelatine is unaltered by the air. Gelatine gives no precipitate with lead acetate, alum, or ferrocyanide of potassium. A mixture of gelatine with potassium dichromate becomes, when exposed to the action of light, insoluble in water.

Gelidium, a genus of *Algæ Floridæ* (see SEAWEEDS). *G. cartilagineum* and the allied *Gracilaria lichenoides* are said to be utilized in the building of the edible birds'-nests so much prized by the Chinese. These and allied species are largely used for food in the East, as yielding wholesome jellies.

Gell (gel), **Sir William,** an English antiquarian; born in Hopton, Derbyshire, England, in 1777. He was educated at Cambridge, and was for some time a fellow of Emanuel College, Cambridge. In 1814 the Princess of Wales (afterward Queen Caroline) appointed him one of her chamberlains, and he accompanied her on her travels for several years. His principal works are: "Topography of Troy," "Geography and Antiquities of Ithaca"; "Itinerary of Greece"; "Itinerary of the Morea"; "Topography of Rome"; and "Pompeiana, or Observations upon the Topography, Edifices, and Ornaments of Pompeii." He died in Naples, Italy, Feb. 4, 1836.

Gellert (gel'ert), or **Killhart,** in Welsh tradition, the famous dog of Prince Llewellyn, which, left in charge of his infant child, after a desperate battle killed a wolf that had entered the house. The prince on his return, seeing the cradle overturned and the floor sprinkled with blood, thought the hound had killed his child, and at once plunged his sword into its side. A moment after he found the child safe under the cradle and the wolf lying dead, and saw too late the faithfulness of his dog. Gellert was buried under a tomb which stands to this day in the lovely village of Beddgelert, near the S. base of Snowdon.

Gellert, Christian Fürchtegott (gel'-lert), a German poet and moralist; born in Hainichen, in the Erzgebirge, Saxony, July 4, 1715. He was educated at the University of Leipsic. After spending some years in teaching, in 1751 he received a professorship at Leipsic, where he lectured on poetry, eloquence, and morals, to large and enthusiastic audiences. His importance in German literature is due to the fact that around him gathered those who revolted against the pedantries and frigid formalities of Gottsched and his school, and thus pioneered the way for the more brilliant reaction of Goethe and Schiller. Gellert came to occupy this position partly on account of his writings, but more on account of his personal character. His writings consist principally of "Fables and Tales" and "Spiritual Songs," both sets great favorites from the simplicity and naturalness of their style, and, in the case of the latter, their unaffected piety. His "Complete Works" appeared in 1769–1774; new edition 1867. He died in Leipsic, Dec. 13, 1769.

Gelli, Giambattista (jel'lē), an Italian dramatist; born in Florence, Italy, Aug. 12, 1493. Originally a stocking weaver, he devoted his leisure to study, became known for his learning, and held thronged public readings on Dante. His writings, partly in dialogue form, are excellent specimens of the Italian of the 16th century. "Readings in the Florentine Academy," "Readings on Petrarch," "Lectures on Dante," and similar studies, are authoritative on their respective subjects. His comedies — "Sport," founded on the "Aulularia" of Plautus, and "Error," a broad burlesque — are famous in Italian literature. He died in Florence, July 24, 1563.

Gellius, Aulus (jel'i-us), a Latin author; flourished in the 2d century of our era. He is supposed to have been born in Rome, and to have studied philosophy at Athens, after which he practised law at Rome without abandoning his literary pursuits. His well-known work, "Attic Nights," begun during the long nights of winter in a country-house near Athens, and completed during the later years of his life, is a collection of miscellaneous matter on language, antiquities, history, and literature, in 20 books, of which the 8th is wanting. It contains many extracts from Greek and Latin authors no longer extant.

Gelnhausen (geln'hou-zen), a town of Prussia, on the Kinzig river, and on the slopes of a vine-clad hill, 26 miles N. E. of Frankfort-on-the-Main. Here, on an island in the Kinzig, Frederick Barbarossa built an imperial residence ("the Pfalz"); and in 1169 he conferred on the village the freedom of the empire. After being transferred to the counts of Hanau in 1435, Gelnhausen began to decay. It has several old buildings, as the town house, some towers, the Catholic church, "princes' house," etc.

Gelon (jē'lon), tyrant of Gela and afterward of Syracuse. He was a scion of a noble family of the former city, and succeeded its tyrant, Hippocrates, in 491 B. C. Six years later he made himself master of Syracuse also, which then became the seat of his government, and to which he transferred the majority of the inhabitants of Gela. Gelon refused to aid the Greeks against Xerxes, as they declined to comply with his demand that he should be appointed commander-in-chief. He became embroiled with the Carthaginians because of their attack on his ally, Theron of Agrigentum, and defeated them in a great victory at Himera, on the same day, according to tradition, on which the Greeks won the battle of Salamis. The clemency and wisdom of Gelon rendered him so generally beloved that when he appeared unarmed in an assembly of the people, and declared himself ready to resign his power, he was unanimously hailed as the deliverer and sovereign of Syracuse. He died about 478 B. C.

Gelsemine, an alkaloid, $C_{22}H_{38}N_2O_4$, occurring in the root of *Gelsemium sempervirens.* It is an amorphous transparent mass, slightly soluble in water, soluble in alcohol and in ether. It tastes bitter and is poisonous; when it is dissolved in sulphuric acid, and potassium dichromate is added, the solution turns a cherry-red color, then violet, and then green.

Gelsemium, a genus of *Loganiaceæ,* or, in the opinion of some, of *Bignoniaceæ. G. nitidum* or *sempervirens,* a climbing shrub with fragrant yellow flowers, is the Carolina jessamine. It has been introduced into greenhouses. In pharmacy, tincture of gelsemium root is used as a sedative; in overdoses it causes death by paralysis of the respiratory muscles.

Gelsenkirchen (gel'zen-kēr-chen), a modern manufacturing town of Westphalia, 4 miles N. W. of Bochum. It owes to coal and iron its rise from a mere village since 1860. Pop. (1880) 14,615; (1885) 20,289.

Gem, a precious stone. Gems are sometimes found crystallized in regular shapes and with a natural polish, more commonly of irregular shapes and with a rough coat. The term gem often denotes more particularly a stone that is cut, polished, or engraved, and it also includes pearls and various artificial productions. The first and most valuable class of gems includes diamonds, emeralds, rubies, sapphires, and a few others; the second class includes the amethyst, topaz, garnet, etc.; while agate, lapis-lazuli, carnelian, etc., though much

Intaglio. Cameo.

GEMS.

used for ornament, can scarcely be called gems. The fabrication of artificial gems is now prosecuted with skill and capital, and has become an important industrial art. The base of one class of imitations is a peculiar kind of glass of considerable hardness, brilliancy and refractive power called paste or strass, which is distinguished from ordinary glass by the presence of 50 per cent. of oxide of lead among its constituents. When the strass is obtained very pure it is melted and mixed with substances having a metallic base, generally oxides, which communicate to the mass the most varied colors. Another class, called semi-stones or doublets, are made by affixing thin slices of real gems to an under part of strass by means of an invisible cement. In some cases an imitation is made by setting uncolored strass or quartz in jewelry with some colored "foil" at the back of it. Attempts have within recent years been made with a fair measure of success to manufacture true gems by artificial processes. The

French chemists Becquerel, Ebelman, Gaudin, Despretz, and others have done much in this direction. In 1858 MM. Deville and Caron communicated to the Academy of Sciences, Paris, a process for the production of a number of gems of the corundum class, as rubies, sapphires, etc. The process essentially consisted in exposing the fluoride of aluminium, together with a little charcoal and boracic acid, in a plumbago crucible protected from the action of the air, to a white heat for about an hour. Many experiments with a view to producing diamonds artificially have also been made. From hydrocarbons, subjected to a very intense heat and enormous pressure, minute fragments of crystalline carbon, differing from natural diamond in no respect save brilliancy, have been produced. See BRILLIANT: DIAMOND: GEM SCULPTURE.

Gemára (ge-mä'rä), that portion of the two Talmuds which contains the annotations, discussions, and amplifications of the Mishnah by the academies of Palestine on the one hand, and those of Babylon on the other. The Babylonian Gemára, more complete as well as more lucid than the Palestinensian, possesses a much more highly valued authority. The final redaction of this latter falls in the middle of the 4th century A. D., while the former was not completed till 500 A. D. See MISHNAH and TALMUD.

Gemini, the third of the zodiacal constellations. The name is given from two conspicuous stars, Alpha and Beta Geminorum, the former named, after the example of the Greeks, Castor; the latter, Pollux. If an imaginary line be drawn through the belt of Orion and two bright stars in the line of the belt, it will nearly pass through Gemini. If again Regulus and Aldebaran be above the horizon, and the space between them be equally divided, the point of bisection will be in Gemini. Castor is a remarkable binary star of the first magnitude, Pollux is of the second. The sun enters the third sign of the zodiac which is different from the actual constellation about May 21, and passes from it to Cancer about June 21.

Gemmation, in botany: (1) The act of budding; specifically, the production of buds in the axils of the floral leaves, the former developing into new flowers or inflorescences. This is seen occasionally in *Scabiosa* and *Dipsacus.* (2) The manner in which young leaves are folded up in a bud before it opens; vernation. (3) The time when buds come forth.

In zoölogy, generation by the development of buds, which in some species, as *Cheroma,* grows out of the forepart of the body, and in others, as *Vorticella,* from the hind part near the stem, or from the stem itself, from which the young animal soon detaches itself. Nicholson considers that the simplest form of gemmation is seen in the power possessed by a crustacean to replace a lost limb. Another form of it is when a foraminifer, consisting of a little sphere of sarcode, develops a second one like the first, then a third one like the second, till quite a group of these little globes has been formed, after which the whole are surrounded by a complex shell. Another kind of it is seen in the flustra, in which a single polypide, by developing a series of buds which remain in contact with the parent stem, finally makes the complex sea mat, which the unobservant mistake for an algal. This is called continuous gemmation. When, as is the case of the freshwater hydra, the new beings developed from buds become disconnected from their parents and set up a separate existence, the phenomenon is called discontinuous gemmation. Finally when the young individuals remain within the body of the parent till that parent dies, this is termed internal gemmation. It occurs in some polyzoa.

Gem Sculpture, the glyptic art, or lithoglyptics; the art of representing designs on precious stones, either in raised work (cameos) or by figures cut into or below the surface (intaglios). The latter method may have been practised at a very early period, and probably had its origin with the Babylonians, who worshiped the heavenly bodies, and were accustomed to wear figured talismans, which served as symbols of their influences. From them the custom of wearing engraved stones passed to the Hebrews. According to others this art originated in India. The Egyptians cut the hardest kinds of stones. The custom of wearing cut stones as seal rings appears to have been general among the Greeks in the time of Solon. One of the earliest artists in this branch of whom mention is made, is Mnesarchus, the father of the philosopher Pythagoras, consequently a contemporary of that Theodorus of Samos who engraved the ring of Polycrates, of which such wonderful stories are told by the ancients. These ancient works were probably intaglios; the artist made use of the lathe, the diamond point, and diamond powder. Respecting the species of stones chiefly used by the ancients, and the mystical powers attributed to the different kinds, see Bellerman's "Urim und Thummim, die ältesten Gemmen" (Berlin).

Whether the Egyptian scarabæi and the Græco-Etruscan imitations of them are the most ancient specimens of this interesting art, may be doubted on account of the form of the stones (cut into the shape of beetles). Yet the specimens of the early period of the art are so rare, that we have not sufficient data for fixing on any class

as prior to that just mentioned. The art seems to have been in a flourishing condition in the age of Alexander the Great; but we are able to judge of the works of Pyrgoteles, Apollonides, and Cronius only from tradition, as there are no works of these masters extant. Pyrgoteles was distinguished for works in relief and from his time the art may have risen gradually to that degree of perfection of which we possess such rich specimens. The artists, some of whose names we learn from their works themselves, often took the masterpieces of sculpture for their subjects and models. Under the Roman emperors, in particular, this was very common. The chief early Greek engraver whose name is known from extant works of his is Dexamenous (late 5th century). The names of Dioscorides, Apollonides, Aulos, Hyllos, Cneius, Solon, remind us of the most perfect works in this branch of art. But some of the greatest ancient works — the sardonyx of the Sainte Chapelle (Paris); the apotheosis of Augustus at Vienna; the onyx at The Hague, representing the apotheosis of the Emperor Claudius; Achilles lamenting Patroclus; the head of Julius Cæsar — these, like the Brunswick vase, and the Trivulcian and Neapolitan cups, bear no distinguished names. Pompey consecrated the dactyliotheca or collection of rings of Mithridates as a votive offering in the Capitol; Julius Cæsar, six tablets with six gems in the temple of Venus. At a later period the collections of Herodes Atticus, of Vespasian, etc., were celebrated; yet this general taste was not able to preserve the art from decline. Notwithstanding the decline of the art, however, gems continued to be highly prized, even in the times of the greatest barbarism, and served to ornament the shrines of saints, royal badges, and ceremonial dresses, and thus passed safely through the ages of destruction and ignorance in which the finest statues were valued as materials for mortar or for building, till ages arrived which could appreciate their value. If we may judge from the remains which have come down to us, engraved gems seem to have been more common in the Byzantine empire than in the West. A splendid collection of antique gems is accessible to the public in the British Museum.

The earliest gem engraver of modern times is Vittore Pisanello, who lived in Florence about the year 1406. Among the Germans, Daniel Engelhard, of Nuremberg, was the earliest. He died in 1512. The discovery of some fine specimens in Italy, particularly in Florence, and the display of gems by the Emperor Palæologus, at the Council of Florence in 1438 were perhaps the original cause of the taste of the Medici for engraved stones. The Popes and that family were the first patrons of this art in modern times. A Florentine artist, generally called on account of his great skill, Giovanni delle Carniole ("of the Cornelians"), distinguished himself in this early modern period. There are few gems which can be ascribed to him with any confidence, besides the famous cornelian in the Florentine Museum, with the portrait of Savonarola, bearing the inscription *Hieronymus Ferrariensis ordinis prædicatorum, prophetavir et martyr.* This stone which must have been engraved later than 1498, is given in Agincourt's "Sculpture." Contemporaries and rivals of Giovanni were Nanni di Prospero delle Carniole, in Florence, whom Francesco Salviati directed in his works, and Domenico Compagnie (*dei camei*), a Milanese, whose portrait of Ludovico Sforza called Moro, cut in a ruby, is still preserved in the Florentine Museum. After Bernardi (delle Carniole), Valerio Vicentino (under Leo X.) rendered himself famous as a gem engraver. This art found patrons in all the Italian princes; the number of artists constantly increased, and the sphere of their art was extended. The names of these artists, however, are not generally known because they were rarely put on the stones. Many gems, too, are still concealed in the cabinets of the wealthy or the treasuries of princes. Till these are accurately described as those of the Ambrosian collection, it will be difficult to obtain a complete general view.

Subjects of antiquity were preferred by these artists, who treated them with such ability that it often requires the skill of the most accomplished connoisseur to distinguish them from genuine antiques. The dispute concerning the famous seal ring of Michael Angelo is well known. It is not improbable that this cornelian is the work of Pietro Maria da Pescia, as the figure of the fisherman in the exergue may indicate the artist, who, with Michelino, belonged to the age of Leo X. In order to give the gems more completely the appearance of antiques, some artists engraved their names in Greek, but with so little knowledge of the language that they sometimes betrayed themselves by this artifice. To this time we must ascribe the gems with the name Pyrgoteles, which Fiorillo endeavors to prove were the works of an Italian of Greek descent (Lascaris).

The art of engraving was also applied to glass and gold. The crystal box of Valerio Belli, the most skillful and industrious artist in this branch during the 16th century, deserves particular mention. It was intended by Clement VII. as a present to Francis I., when Catharine de' Medici went to Marseilles in 1533. At present it is in Florence.

The Milanese particularly distinguished themselves in gem sculpture, as the wealth of the principal citizens of Milan enabled

them to patronize this art. Jacopo da Trezza, the same artist who in 1564 executed for Philip II. the famous tabernacle of the Escurial, made the first attempts at engraving on the diamond in Milan. The greatest cameo work of modern times is the stone from Florentine Museum, seven inches in breadth, on which Cosmo, Grand-Duke of Tuscany, with his wife, Eleonore, and seven children, are represented. A Milanese, John Anthony de Rossi, who was a contemporary of the Saracchi family (about 1570), is the artist. The Saracchi were five brothers, and the crystal helmet of Albert of Bavaria is a proof of their skill..

The first traces of gem engraving in Germany are found in the 14th and 15th centuries, in Nuremburg and Strassburg, in the former of which towns Daniel Engelhard appears as the earliest engraver of dies in Germany. Natter, himself a distinguished artist in gem engraving, has given an account of his predecessors in his "Traité de la Méthode Antique de graver en Pierre Fine, comparée avec la Méthode Moderne" (London, 1755). Natter, along with Pichler and Marchant, are considered as the restorers of this art in that country. The most eminent artist of more modern times is, perhaps, Berini, a native of Rome, who with Cervara and Giromelli at Rome, and Putinati at Milan, produced very fine works. At the present day gem engraving seems hardly to be practised anywhere.

Genappe (zhe-näp′), a town of Belgium, in the province of South Brabant, 15 miles from Brussels. Many battles have been fought here at different times. It is, however, chiefly memorable as the site of the first of that series of battles which, in June, 1815, were terminated on the field of Waterloo.

Genast, Karl Albert Wilhelm (gā-näst), a German poet and dramatist; born in Leipsic, Saxony, July 30, 1822. He studied law and then entered politics, becoming one of the leaders of the popular party at Weimar. "Bernhard of Weimar," a tragedy, "Little Thorn-Rose," a volume of poems, and "Florian Geyer," a novel, are his most notable works. He died in Weimar, Germany, Jan. 18, 1887.

Genazzano (jā-nat-sä′nō), a small town, 27 miles E. of Rome, containing an old castle of the Colonna family, and the far-famed pilgrimage-chapel of the Madonna del Buon Consiglio (the Madonna of Good Counsel).

Gendarme (zhon-därm′), one of the armed police of France. They are divided into horse and foot gendarmes. They are all picked men, and are usually selected from the military forces for their courage and good character. They are divided into brigades, and a number of brigades form a departmental company. The *gens-d'armes* were originally the king's horse-guards only, but afterward the king's *gardes-du-corps* (body-guard); the musketeers and light-horse were reckoned among them. There was also a company of gentlemen (in number about 250) bearing this name.

Gender, a Javanese musical instrument. It consists of a row of parallel metallic plates supported horizontally by two strings passed through the respective nodal lines of the plates. Underneath each plate is an upright bamboo, containing a column of air of such a height as to reciprocate the sound of the plate above.

Genealogy, the systematical investigation and exhibition of the origin, descent, and relations of families (or their "pedigree"). Persons descended from a common father constitute a family. Under the idea of "degree" of relationship is denoted the nearness or remoteness of relationship in which one person stands with respect to another. A series of several persons descended from a common progenitor is called a "line." A line is either "direct" or "collateral." The collateral lines comprehend the several lines which unite in a common progenitor. For illustrating descent and relationship genealogical tables are constructed, the order of which depends on the end in view. The common form of genealogical tables places the common stock at the head, and shows the degree of each descendant by lines. Some tables, however, have been constructed in the form of a tree, in which the progenitor (German, *Stammvater*, "trunk-father") is placed beneath, as if for a root.

Genée, Rudolf (zhe-nā′), a German author; born in Berlin, Prussia, Dec. 12, 1824. He abandoned wood engraving for journalism, and then became an instructor in literature at Berlin. As a reader and interpreter of Shakespeare he attained distinction; but his plays — "The Prodigy" (1854), "A New Timon," "In Front of the Cannon," "The Hermitess," and adaptations from Sheridan — raised him to the front rank. His works in criticism, treating of German poetry, the drama, and kindred themes, are standard. "Marienburg" is his successful historical novel.

General, the title of a military office of varying importance in different countries. In the United States this office was created by Congress for General Grant and that of lieutenant-general for General Sherman. After the death of General Grant the office was conferred on General Sherman and General Sheridan was promoted to lieutenant-general, and on the death of General Sherman the office was revived for General Sheridan. With the latter the offices of

lieutenant-general and general expired by law. That of lieutenant-general was revived in 1895 for Maj.-Gen. John M. Schofield, and again in 1901, when Maj.-Gen. Nelson A. Miles was appointed its incumbent. When the office of lieutenant-general has expired by law the senior major-general becomes the commanding officer of the army, under the direction of the President. A major-general, in time of war commands a division or army corps of several divisions, and a brigadier-general a brigade, and, in emergencies, a division.

General Education Board, an organization incorporated by Congress in 1903 and endowed by JOHN D. ROCKEFELLER (*q. v.*) with three gifts aggregating $43,000,000, "to promote education in the United States without distinction of race sex, or creed" and "make effective various forms of educational benevolence." The office is in New York city.

Generalization, the act of comprehending under a general name a number of objects which agree in one or more points. These points are specially attended to by the process of ABSTRACTION (*q. v.*), and are indicated by the common name. The result of generalization is a common name or general term which stands for the many objects in so far only as they all agree. This process is closely akin to classification and to definition; and the higher kind of generalization is INDUCTION (*q. v.*). In logic the genus is a higher class which includes a lower, the lower one being the SPECIES (*q. v.*); but the distinction is relative. That which is a genus in relation to its species is itself a species in regard to a higher genus. The genus has the larger extension, the species the larger intension. For the great question as to whether the genera and species have a real existence, see NOMINALISM. For genus in natural history, see GENUS.

Generating Function, a term used by Laplace, in solving equations of differences, to denote any function of x considered with reference to the coefficients of its expansion in powers of x.

Generation, in mathematics, the formation of any magnitude by the motion of a point, or a magnitude of an inferior order. Thus, if a point move in accordance with any mathematical law, the path which it traces out is said to be generated by the point, and is a mathematical line. If a mathematical line be moved in accordance with a mathematical law, the surface in which it is always found is said to be generated by the line, and is always a mathematical surface. The moving point or magnitude is called the generatrix, and the law according to which the motion takes place is called the law of generation. In physiology, the function which has for its object the propagation of the species. Generation presents many points of resemblance in plants and animals. In the former it is cryptogamic or phanerogamic; in the latter non-sexual or sexual. In the cryptogamic and non-sexual generation, the new individual is developed by a separation of particles from the body of the parent, by which the new formation is nourished till it has so far matured as to be capable of an independent existence.

Generator, an apparatus for generating carbonic acid gas for charging soda-fountains or bottles with aërated water. In chemistry, a term used to denote the elements or compounds from which a more complex substance is obtained. Thus ethyl, alcohol, and acetic acid are the generators of acetic ether; and benzoic acid and glycocoll are the generators of hippuric acid. By the action of acids or alkalies these substances can be resolved into their generators, and so the constitution of a complex body can be determined; thus, Lecithin, a constituent of the brain, has the formula $C_{44}H_{90}N \cdot P \cdot O_9$; it has six generators, glycerin, phosphoric acid, stearic acid, glycol, methyl alcohol, and ammonia; therefore it is found to be a distearate glycerophosphate of choline, and choline has been found to be a trimethyl oxyethyl ammonium hydrate $(CH_3)_3N \cdot CH_2 \cdot OH \cdot CH_2 \cdot OH$. In distilling, a retort in which volatile hydrocarbons are distilled from liquid or solid matters.

In electricity, a DYNAMO-ELECTRIC MACHINE (*q. v.*). In music, a ground note, fundamental bass, root, derivative. The principal sound or sounds by which others are produced, as the lower C for the treble of the harpsichord, which beside its octave will strike an attentive ear with its twelfth above or G in alt, and with its fifteenth above or C in alt. In steam, a vessel in which steam is generated from water, for use in a steam engine, a heating apparatus, etc. The term was first applied to the Perkins steam boiler, in which water in small quantity was heated to a high temperature. It is now specifically applied to a class of instantaneous generators. The name is now rapidly coming into use for all apparatus for generating steam, being held to be more correct than the usual term.

Genesee, a river of the United States, which rises in Pennsylvania, flows N. through New York, and falls into Lake Ontario 6 miles below Rochester, after a course of 145 miles. It is notable for its varied and romantic scenery, and its extraordinary falls. These falls are five in number; three of them occur about 90

miles from the mouth of the river, and are respectively 60, 90, and 110 feet high. The other two are near Rochester, and are both about 100 feet high.

Genesis, in mathematics, a term formerly used, meaning the same as generation. In the genesis of figures, the moving magnitude or point is called the describent; the guiding line of the motion is called the dirigent.

In Scripture, the first book of the Pentateuch, of the Old Testament, and of the Bible. In the Hebrew original, as well as in the Septuagint and all modern versions, it occupies this place. It is called in Hebrew *bereshith*, which is its initial word, correctly translated in the authorized English version, "In the beginning." The opening chapter narrates the creation by God of this earth and all worlds (i: 1-16); ch. ii: 1–3 should have been added to this chapter. Chapters ii: 4–end to xi: 9, are occupied with archaic events in the history of the human race generally. At xi: 10 a genealogy begins, designed to give the pedigree of Abram or Abraham, "the father of the faithful," divinely selected from an idolatrous race and family (Joshua xxiv: 2) to found a race (the chosen Jewish one) which should be the special depositaries and defenders of true religion against other races more or less apostate or unenlightened. The remainder of the book gives the history of Abraham, and those of his immediate descendants who were special heirs of the promises made to him — viz., Isaac, Jacob, and the twelve patriarchs (Heb. xi: 9). Counting only from the creation of Adam to the last event in Genesis (the death of Joseph), the space of time is vast; but as the Hebrew, the Septuagint, and the Samaritan Pentateuchs all differ as to certain numbers, the exact amount cannot be stated.

The Jewish and, following it, the early Christian Church almost unanimously pronounced Moses the author of the work, deriving his knowledge of the events prior to his time either from direct revelation or from prior documents consulted under divine guidance. In A. D. 1753 Astruc, an eminent French medical professor, attempted to point out two such documents, distinguishable by the fact that in one the Divine Being is called almost always Elohim, while in the other he is named Jehovah. On the revival of this hypothesis in the 19th century, Hengstenberg and others contended against it, maintaining that in every case there was a reason why the Divine name which we find in the particular verse was chosen. Most critical scholars adhere to the opinion of Astruc, and perpetually speak of the ELOHIST (*q. v.*) and the JEHOVIST (*q. v.*). See also ASTRUC, JEAN.

Genet (je-net'), in ordinary language, the fur of *Genetta vulgaris*, which is made up into muffs, tippets, etc.; hence, used for catskins made up in imitation of their fur, and used for the same purpose. In zoölogy, *Genetta vulgaris* or *Viverra genetta*, a mammal belonging to the family *Viverridæ*. It is gray, spotted with black and brown, with a long tail, which is ringed with black and white. There is white also on the eyebrows, the cheeks, and the sides of the nose. Its fur is soft and fine. It is found from the South of France to the Cape of Good Hope, living on the banks of rivers or near springs. In Constantinople it is domesticated like a cat.

Genetic Affinity, in biology, affinity founded on resemblances existing from a very early age, and which therefore is presumed to imply original relationship. It is called also histological affinity. Evolutionists assign a greatly enlarged sphere of operation to such genetic affinity.

Genetic Spiral, in botany, a helix winding round the stem of a plant, and formed by the points of growth of all the branches.

Geneva, a town of Switzerland; capital of the canton of the same name; at the W. extremity of the Lake of Geneva, where the Rhone issues, here crossed by several bridges, and dividing the town into two portions, the larger and more important of which is on the left or S. bank. The environs are covered with handsome villas. The upper town, occupied chiefly by the wealthier citizens, consists of well-built houses and handsome hotels; the lower town, the seat of trade and residence of the poorer classes, consists largely of houses remarkable for their height, and lining narrow, irregular, dark, and ill-cleaned streets, but great improvements have recently been carried out. The more important public buildings are the cathedral or Church of St. Pierre, a Gothic structure of the 10th, 11th, and 12th centuries; the town house in the Florentine style; the Musée Rath, containing a collection of pictures, etc.; the university building, nearly opposite the botanic garden, rebuilt in 1867–1871, and containing the public library, founded by Bonivard (see BONIVARD, FRANÇOIS DE), in 1551, and now numbering over 90,000 volumes; and the Museum of Natural History. Manufactures, watches, music-boxes, and jewelry, for all of which the town is famed. In literature and science Geneva has long occupied a distinguished place, and it has been the birthplace or the residence of many eminent men, including Calvin, Beza, Knox, Le Sage, Necker, De Candolle, Rousseau, Sismondi, etc. Geneva

early adopted the principles of the Reformation, and chiefly through the teaching of Calvin the town acquired an important influence over the spiritual life of Europe, and became the center of education for the Protestant youth of Great Britain, France, and Germany. Pop. (1909) commune, 121,200, including suburbs.

The canton is bounded by the canton of Vaud and the Lake of Geneva, and by France; area, 108 square miles; pop. (1908) 151,751. It belongs to the basin of the Rhone; the only important streams are that river and the Arve, which joins it a little below the town of Geneva. The soil has been so much improved by skillful and persevering culture that abundant crops of all kinds suitable to the climate are raised. Manufactures, chiefly clocks and watches, music-boxes, mathematical instruments, gold, silver, and other metal wares, woolen cloths, and silk goods of various descriptions, hats, leather, and articles in leather; and there are numerous cotton mills, calico printing works, and dye works. The territory of Geneva having, through the Congress of Vienna, obtained an accession of 15 communes, detached from France and Savoy, was admitted a member of the Swiss Confederation in 1814, and ranks as the 22d canton. Its constitution of 1848 is the most democratic in the federation. All religious denominations are declared to have perfect freedom, but two of them are paid by the State — the Roman Catholics, amounting to rather more than a third of the population, and the Protestant National Church. Language French.

Geneva, a city in Ontario co., N. Y.; on Seneca Lake, the Seneca and Cayuga Canal, and the New York Central and the Lehigh Valley railroads; 50 miles S. E. of Rochester. It is the seat of Hobart College, the Geneva Medical College, and the State Agricultural Experiment Station, and has important manufactures, extensive waterworks, public library, high school, electric lights and street railroads, 2 National banks, and an assessed property valuation of $5,500,000. Pop. (1890) 7,557; (1900) 10,433; (1910) 12,446.

Geneva Award, the settlement of the Alabama claims by five arbitrators, appointed by the President of the United States, the Queen of Great Britain, the King of Italy, the President of the Swiss Confederation, and the Emperor of Brazil. These rulers, in the above order, named as arbitrators Charles Francis Adams, Lord Chief-Justice Sir Alexander Cockburn, Count Federigo Sclopis, Mr. Jacques Staempfli, and Baron Itajuba. J. C. Bancroft Davis and Lord Tenterden, respectively, represented as agents the United States and Great Britain. The tribunal met at Geneva, Switzerland, Dec. 15, 1871, and Count Sclopis was made president. The United States claimed damages both for direct and for indirect losses, and for injuries occasioned by 13 vessels. The tribunal decided to allow only direct losses caused by the "Florida" and the "Alabama," with their tenders, and by the "Shenandoah" during part of her cruise. Various rules of international law were laid down which supported most of the contentions of our government. On Sept. 14, 1872, the tribunal "awarded to the United States a sum of $15,500,000 in gold as the indemnity to be paid by Great Britain to the United States as the satisfaction of all the claims referred to the consideration of the tribunal." The English representative cast the only dissenting vote, but Great Britain accepted the decision and paid the award within a year.

Geneva Bible, a translation of the Bible into English, made at Geneva, chiefly by English refugees, and published there in 1560. It was the first English Bible which adopted the Roman instead of the obsolescent black type, and the first which recognized the division into verses; it was the first also which omitted the Apocrypha. From its stating, in Gen. iii: 7, that our first parents made themselves "breeches," it is sometimes called the Breeches Bible.

Geneva College, a coeducational institution in Beaver Falls, Pa., founded in 1848 under the auspices of the Reformed Presbyterian Church; has grounds and buildings valued at over $175,000; endowment, about $170,000; volumes in the library, over 4,000; ordinary income, about $15,000; average number of faculty, 18; average student attendance, including summer school, 300.

Geneva Convention, a convention signed by the chief European continental powers in 1864, providing for the succor of the sick and wounded in war. It has since been ratified by Great Britain, the United States, Japan, and about 40 other nations. The chief provisions are:

1. The neutrality of ambulances and military hospitals.

2. The personnel of such ambulances and hospitals, including sanitary officers and naval and military chaplains, to be benefited by the neutrality.

3. The inhabitants of a country, rendering help to the sick and wounded, are to be respected and free from capture.

4. No distinction to be made between the sick and wounded, on account of nationality.

5. A flag and uniform to be adopted, and an armlet for the personnel of ambulances and hospitals. The flag and armlet to consist of a red Greek cross on a white ground.

The Turks use a red crescent in place of the cross.

Other provisions have since been added intended to mitigate the severity of naval combat, and cover cases of capture and sinking of vessels. To carry out the terms of this convention, the International Society for the Aid of the Sick and Wounded has been organized, with committees in the chief towns in the United States and in Europe. It first played an important part in the Franco-German War, every nation sending its contingent of ambulances, surgeons, etc. During the American-Spanish War, the American National Red Cross, under the personal direction of its president, Clara Barton, nursed, with indiscriminate mercy, thousands of American, Spanish, and Cuban sick and wounded soldiers, and supplied with food and medicines thousands of sick and helpless Cuban noncombatants. The Red Cross ships proved of valuable service in ameliorating the horrors of the naval warfare.

Geneva Gown, the ordinary preaching gown worn by Presbyterian ministers and by Low Church clergymen in England. It is of black silk, and in shape resembles the gown of a Cambridge, England, D. D. It was adopted by the followers of Calvin, and by the reformers who took refuge in Geneva, as a protest against the use of the alb.

Geneva, Lake of, or **Lake Leman** (Latin, Lacus Lemanus), the largest of the Swiss lakes, extending in the form of a crescent, with its horns pointing S., between France on the S., and the cantons of Geneva, Vaud, and Valais; length, measured on the N. shore, 55 miles; and on the S. shore 40 miles; central breadth, about 6 miles; area, 331 square miles; greatest depth, 900 feet. It is 1,150 feet above the sea. On the N. the shore is low, and the ground behind ascends gradually in beautiful slopes. On the S., and particularly at the E. end, the shore is rocky and abrupt, and lofty precipices often rise sheer from the water's edge. It contains various species of fish. The water is remarkably pure and of a beautiful blue color. The Rhone, which enters the E. extremity a muddy, turbid stream, issues from the W. extremity perfectly pellucid, and likewise of the finest blue.

Geneva Watch, properly a kind of watch manufactured at Geneva, or of Swiss make; but also applied to any watch of similar construction. These watches have neither fuse nor chain, and are of inferior workmanship to the American lever watch.

Geneviève (zhen-vyāv), **St.,** the patron saint of Paris; born in Nanterre, near Paris, about 422. She devoted herself while yet a child to the conventual life. Her prayers and fastings are credited with having saved Paris from threatened destruction by Attila in 451. Her festival is held Jan. 3. She died in Paris, Jan. 3, 512.

Geneviève, St., Duchess of Brabant, wife of Siegfried, count palatine in the reign of Charles Martel (about 750). According to the legend, which is the subject of several tales and dramas, she was accused of adultery during her husband's absence and condemned to death; but was allowed to escape, and lived six years in a cavern on nothing but herbs. She was finally found and carried home by her husband, who in the meantime had become convinced of her innocence.

Genghis Khan, or **Jenghis Khan** (jen'-gis khän), a Mongol conqueror; born near the Onon river, Mongolia, in 1162. His father was chief over 30 or 40 clans, but paid tribute to the Tartar Khan. He succeeded his father when only 14 years of age, and made himself master of the neighboring tribes. A great number of tribes now combined their forces against him. But he found a powerful protector in the great Khan of the Karaite Mongols, Oung, or Ung, who gave him his daughter in marriage. After much intestine warfare with various Tartar tribes Genghis was proclaimed Khan of the United Mongol and Tartar tribes.

He now professed to have a divine call to conquer the world, and the idea so animated the spirit of his soldiers that they were easily led on to new wars. The country of the Uigers, in the center of Tartary, was easily subdued, and Genghis Khan was now master of the greatest part of Tartary. In 1209 he passed the great wall of China, the conquest of which country occupied him more than six years; the capital, Yenking, now Peking, was taken by storm in 1215 and plundered. The murder of the ambassadors whom Genghis Khan had sent to the King of Kharism (now Khiva) occasioned the invasion of Turkestan in 1218 with an army of 700,000 men; and the two cities of Bokhara and Samarcand were stormed, pillaged, and burned. Seven years in succession was the conqueror busy in the work of destruction, pillage, and subjugation, and extended his ravages to the banks of the Dnieper. In 1225, though more than 60 years old, he marched in person at the head of his whole army against the King of Tangut (Southwestern China), who had given shelter to two of his enemies. A great battle was fought, in which the King of Tangut was totally defeated with the loss of 300,000 men. The victor remained some time in his newly-subdued provinces, from which he also sent two of his sons to complete the conquest of Northern China. At his death in Mongolia,

in 1227, his immense dominions were divided among his four sons.

Genii (jē′ni-ī), fabulous beings regarded by the Arabians as intermediate between angels and men, and capable of assuming any form or of becoming invisible at pleasure. The singular is genie. See JIN.

Genioglossus Muscle, a fan-shaped muscle arising by a short tendon from the chin above the geniohyoid muscle, and entering the middle of the tongue to bring it forward.

Geniohyoid Muscle, a narrow muscle arising from the inferior of the two genial tubercles behind the symphysis of the jaw, and inserted into the anterior surface of the body of the hyoid bone.

Genipa, a genus of cinchonaceous plants, tribe *Cinchoneæ,* family *Gardenidæ.* It consists of fruit-bearing trees. *G. americana,* the marmalade box of Dutch Guiana, bears the GENIPAP (*q. v.*). The fruit of *G. brasiliensis* is also eaten in Brazil, but, according to Martius, it is not fit to be used till it has become bletted, and is better preserved with sugar than fresh.

Genipap (Guiana name), the fruit of *G. americana.* It is as large as an orange, is whitish-green, but has a dark purple juice with an agreeable vinous taste. It is in much request in Dutch Guiana.

Genista, in botany, the typical genus of the sub-tribe *Genisteæ.* It has the calyx shortly two-lipped and the lips deeply toothed. Seventy species are known. *G. tinctoria* is the dyers' greenweed. It yields a yellow dye. Ray says that the milk of cows feeding on it is rendered bitter, and that this bitterness is retained in butter and cheese made from the milk. *G. pilosa,* also unarmed, is rare and local, while *G. anglica,* a spinous plant, is common.

Genisteæ (-nis′te-ē), a sub-tribe of papilionaceous plants, tribe *Loteæ.* It consists of shrubs with entire leaflets and the stamens all united instead of being diadelphous.

Genius, in Roman mythology, a tutelary deity; the ruling and protecting power of men, places, or things; a good or evil spirit supposed to be attached to a person and influence his actions. The genii of the Romans were the same as the daimones (demons) of the Greeks. According to the belief of the Romans, which was common to almost all nations, every person had his own genius; that is, a spiritual being, which introduced him into life, accompanied him during the course of it, and again conducted him out of the world at the close of his career. The genii of women were called Junones.

Genlis (zhon-lēs′), **Stéphanie Félicité Ducrest de St. Aubin, Comtesse de,** a noted French writer; born in Champcéri, Burgundy, Jan. 25, 1746. At the age of 16 she was married to the Comte de Genlis, and in 1770 was made lady-in-waiting to the Duchesse de Chartres. In 1782 the Duc de Chartres, afterward known as Égalité, appointed her "governor" of his children, including Louis-Philippe. She wrote a variety of works for her pupils, among others "Theater of Education" (1779–1780), a collection of short comedies; "Annals of Virtue" (1781); "Adèle and Theodore, or Letters on Education" (1782); "The Vigils of the Château" (1784). On the breaking out of the Revolution she took the liberal side, but was ultimately compelled to seek refuge (1793) in Switzerland and Germany. When Bonaparte became consul she returned (1799) to Paris and received from him a pension. Her writings amounted to about 90 volumes. Among them are the romance "Mademoiselle de Clermont" (1802); "Memoirs" (1825); "Baron d'Holback's Dinners." The last contains a great deal of curious but malicious information concerning the freethinkers of the 18th century. She died in Paris, Dec. 31, 1830.

Gennaro, San. See JANUARIUS.

Gennesaret, Lake of. See GALILEE, SEA OF.

Genoa (jen′ō-ä) (ancient Genua), a city of Italy, situated on the Gulf of Genoa, at the foot of the Apennines, the capital of the province and the most important seaport; 801 miles S. E. of Paris. While worthy of its title, "Genoa the Superb," as viewed from the sea, it is in reality built awkwardly on irregular rising ground, and consists of a labyrinth of narrow and intricate lanes, accessible only to foot-passengers or pack-mules. The dark thoroughfares are lined with tall buildings, some of them of marble and handsome architecture, but now in many cases hotels or business places. Of the palaces the most famous are the ducal palace formerly inhabited by the doges, now appropriated to the meetings of the senate; and the Doria, presented in 1529 to the great Genoese citizen Andrea Doria, whose residence it was during his presidency of the republic. The palaces Brignole-Sale, Reale, Durazzo-Pallavicini, Spinola, Balbi-Senarega, and others possess great interest on account of their historical fame and architectural beauty. Many of them contain galleries of paintings; the Brignole-Sale has works by Van Dyck, Rubens, Albrecht Dürer, Paolo Veronese, Guercino, etc. Among the churches are the cathedral of St. Lorenzo, a grand old pile in the Italian Gothic style; the church of St. Ambrogio (1589), containing pictures by Guido Reni and Rubens; the church of St. Stefano, containing an altar-

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piece by Giulio Romano; L'Annunziata, splendid inside with marbles and rich gilding. The marble municipal palace, built in the Late Renaissance style, with a magnificent vestibule, courtyard, and galleries, and the palace of the Dogana must also be mentioned. Genoa has a university, founded in 1243, a library of 116,000 volumes; also numerous technical schools and institutions of higher education. The hospital, the asylum for the poor (capacity 2,200), the deaf and dumb institution, and the hospital for the insane are among the finest institutions of their kind in Italy. There are numerous excellent philanthropic foundations, as the Fieschi, an asylum for female orphans. The public library contains 50,000 volumes; and there are the Academy of Fine Arts, founded (1751) by the Doria family; the Carlo Felice Theater, one of the finest in Italy; and the Verdi Institute of Music.

Genoa is the commercial outlet of a wide extent of country, of which the chief exports are rice, wine, olive oil, silk goods, coral, paper, macaroni, and marble. The imports are principally raw cotton, wheat, sugar, coal, hides, coffee, raw wool, fish, petroleum, iron, machinery, and cotton and woolen textiles. The annual exports of Genoa are valued at nearly $20,000,000, the imports are returned at more than $75,000,000. In 1898, 6,084 vessels of 4,560,795 tonnage entered the port, and 6,141 of 4,584,041 tonnage cleared. The principal industries are iron works, cotton and cloth mills, macaroni works, tanneries, sugar refineries, and vesta-match, filigree, and paper factories. Pop. (1906) 234,710.

History.— The history of Genoa may be traced back in legendary traditions to a time preceding the foundation of Rome. It was one of the most considerable cities of the Ligurians, and is mentioned by Livy (under the name of Genua) as being in friendly relations with Rome at the beginning of the second Punic war. It was subdued and partly destroyed during that war by a Carthaginian fleet under the command of Mago. The Romans rebuilt it, and it afterward became a Roman municipium. After the decline of the Roman empire in the West it fell into the hands of the Lombards, and with them became subject to the Franks. After the downfall of the empire of Charlemagne, Genoa erected itself into a republic, and till the 11th century shared the fortunes of the cities of Lombardy. The situation of the city was favorable to commerce, and it pursued the trade of the Levant even earlier than Venice.

The acquisitions of the Genoese on the Continent gave rise as early as the beginning of the 12th century to violent contentions with the enterprising and industrious merchants and tradesmen of Pisa, who became their near neighbors after Genoa had made itself master of the Gulf of Spezza. In 1174 Genoa possessed Montferrat, Monaco, Nice, Marseilles, almost the whole coast of Provence, and the island of Corsica. The quarrel with the Pisans continued above 200 years, and peace was not concluded till Genoa had destroyed the harbor of Pisa and conquered the island of Elba. Not less violent was the contest with Venice which was first terminated in 1282 by the peace of Turin. As it was the dominion over the W. part of the Mediterranean which formed the subject of dispute with Pisa, so in the war with Venice it was contended which should possess the E. portion of that sea.

The Genoese made commercial treaties with the different nations of the Levant. Their superiority in trade was at its highest point at the time of the revival of the Græco-Byzantine empire, about the middle of the 13th century. Long before, the inactivity of Constantinople had allowed the Genoese to obtain a large share in the commerce of the Grecian States. But when the Genoese took possession of the town of Kaffa, now Feodosia, in the Crimea (1266), they also acquired the control of the Black Sea and its trade. If Genoa had adopted a wise colonial system she would have held the first rank among the commercial nations at the end of the Middle Ages. After the conquest of Constantinople by Mohammed II. in 1453 the Genoese soon suffered for the aid they had imprudently afforded the Turks. Mohammed took from them their settlements on the Black Sea in 1475, and at length all access to this branch of trade was denied them by the Turks.

While the power and commercial rank of Genoa were attaining their height by means of their foreign trade and acquisitions of territory the city was internally convulsed by civil discord and party spirit. The hostility of the democrats and aristocrats and the different parties among the latter occasioned continual disorders. In 1339 a chief magistrate, the doge, was elected for life by the people, but he had not sufficient influence to reconcile the contending parties. A council was appointed to aid him; yet after all attempts to restore order to the State, there was no internal tranquillity; indeed, the city sometimes submitted to a foreign yoke in order to get rid of the disastrous anarchy which the conflict of parties produced. In the midst of this confusion St. George's Bank (Compera di S. Giorgio) was founded. It owed its origin to the loans furnished by the wealthy citizens to the State, and was conscientiously supported by the alternately dominant parties.

In 1528 the disturbed State regained tranquillity and order which lasted till the end of the 18th century. The form of gov-

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ernment established was a strict aristocracy. The doge was elected to be the head of the State. He was required to be 50 years of age, and to reside in the palace of the republic (*palazzo della signoria*), where also the senate held their meetings. The doge had the right of proposing all laws in the senate. Without his acquiescence the senate could pass no decree, and the orders of the government were issued in his name. He continued in office two years, after which he became a senator and procurator, and at the expiration of five years was again eligible to the office of chief magistrate. The doge was assisted in the administration of the government by 12 governors and eight procurators (not counting such as had previously held the office of doge), who likewise retained their office two years. They constituted the privy council, who, with the doge, had charge of all State affairs. The procurators had charge of the public treasury and state revenue. The sovereignty possessed in the first instance by the great council composed of 300 members, among whom were all the Genoese nobles who had reached the age of 22 years. Secondly, by the smaller council consisting of 200 members. Both had a right to deliberate with the governors and procurators upon laws, customs, levies, and taxes, in which cases the majority of votes decided. It belonged to the smaller council to negotiate respecting war and peace and foreign alliances; and the consent of four-fifths, at least, of the members was required for passing a law. The nobility were divided into two classes — the old and new. To the old belonged, besides the families of Grimaldi, Fieschi, Doria, Spinola, 24 others who stood nearest them in age, wealth, and consequence. The new nobility comprised 437 families. The doge might be taken from the old or new nobles.

Little by little Genoa lost all her foreign possessions. Corsica, the last of all, revolted in 1730 and was ceded in 1768 to France. When the neighboring countries submitted to the French in 1797 the neutrality which the republic had strictly observed did not save the fluctuating government from ruin. Bonaparte gave to them a new constitution formed on the principles of the French representative system. Two years afterward a portion of the Genoese territory fell into the hands of the Austrians; but the fate of Genoa was decided by the battle of Marengo. A provisional government was established, and in 1802 it received a new constitution as the Ligurian republic. The doge was assisted by 29 senators and a council of 72 members. The members of the council were elected by three colleges, and consisted of 300 landed proprietors, 200 merchants, and 100 men of the literary professions. The republic also acquired some increase of territory, and had in 1804 a population exceeding 600,000. Its naval force, which was so formidable in the Middle Ages, at last dwindled down to only a few galleys and barques; the land force became almost equally insignificant. The shipping trade in June, 1805, when the republic was incorporated with the French empire, was but the shadow of its former greatness, and extended no further than to Italy, the S. of France, Spain and Portugal.

Before the Napoleonic wars the Genoese supplied a great part of Italy with Eastern spices, which were brought to them by the Dutch; with sugar and coffee, partly from Lisbon and partly from Marseilles; and with fish and salt. Ships from Hamburg brought Saxon linen and cloth. The carrying trade of Genoa was of consequence, but the most important branch of its business was its dealings in money and exchange. Many of the European States, Spain particularly, were debtors to the Bank of Genoa, and to wealthy individuals in the city. The bank was in part for loans and partly for deposit. It possessed some fine territories and its income was over 10,000,000 French livres. But the more frequently the State sought relief from the bank in its pressing wants so much more did it decline in credit. The republic had pledged various imposts for the payment of the interest on capital borrowed from the bank, which were continually increased if they were not sufficient to pay it. At the union of Genoa with the French empire the bank was abolished and its debts were transferred to the account books of France.

On the overthrow of the French empire Genoa was occupied by the British, with whose permission the ancient constitution was reëstablished. But the Congress of Vienna in 1815 assigned Genoa with its territories to Sardinia, stipulating that it should have a sort of representative constitution. In 1821 it joined for a moment the revolutionary movements of Italy. In the spring of 1849, after the defeat of Charles Albert at Novara and the conclusion of a truce with the Austrians, a revolutionary outbreak took place, the national guards occupied the forts, and the garrison was compelled to withdraw. A provisional government was formed and the independence of the republic was proclaimed. But a large body of Sardinian troops under Gen. Della Marmora, soon appeared before the city; a bloody struggle ensued and the forts and principal points of the city were taken by the royal soldiery. Meanwhile a deputation was sent to Turin, which returned with the amnesty of the king, excluding the chief leaders of the movement, who, however, escaped on board an American vessel. In April the city was disarmed and the monarchical government restored. Following the fortunes of the Sardinian States, Genoa became a portion of the kingdom of Italy.

Genoa, Gulf of, a large indentation in the N. shore of the Mediterranean, N. of Corsica, having between the towns of Oneglia on the W. and Spezia on the E. a width of nearly 90 miles, with a depth of about 30 miles.

Gentian Spirit, an alcoholic liquor much drunk by the Swiss; it is made by the vinous fermentation of the infusion of gentian.

Gensichen, Otto Fanz (gen'sich-en), a German dramatist; born in Driesen, Prussia, Feb. 4, 1847. He produced a wide variety of pieces, as "Caius Gracchus" and "Danton," tragedies; "Euphrosyne," "Phryne," and "Aspasia," spectacular plays; and several one-act "curtain-raisers." His most brilliant effects were obtained with historical love-stories. He wrote a volume of miscellaneous poetry and a historical novel of merit.

Gentianales (ā'lēz), in botany, the gentianal alliance. An alliance of perigynous exogens, with dichlamydeous, monopetalous flowers, axile or parietal placentæ and a minute embryo, or with the cotyledons much smaller than the radicle, lying in a large quantity of albumen. Lindley includes under it the orders *Ebenaceæ, Aquifoliaceæ, Apocynaceæ, Loganiaceæ, Diapensiaceæ, Stilbaceæ, Orobanchaceæ,* and *Gentianaceæ.*

Gentil Bernard. See BERNARD, PIERRE JOSEPH.

Gentiles, in Scripture, all the nations of the world, excepting the Jews. In the Old Testament it is the rendering of the Hebrew word *goim* = peoples, nations, the plural of *goi* = a nation, a people. At first it was used as a mere ethnological word, and quite respectfully, but as the Jews became more conscious of their privileges they employed it more and more scornfully of the nations around (Gen. x: 5; Isa. lxvi: 19; Jer. xiv: 22). In the New Testament Gentiles is the rendering of the Greek *ethne* = the plural of *ethnos* = a number of people living together, a nation. St. Peter, moved by a vision, was the first of the Twelve to preach to the Gentiles (Acts x.), but the Apostle of the Gentiles was St. Paul (Gal. ii: 15).

Gentilly (zhon-tē-yē'), a S. suburb of Paris, on the circular railway, at the foot of the Bicêtre hill. It has a number of villas, tanneries, and manufactures of biscuits, vinegar, mustard, and soap. Pop. (1891) commune, 15,017, many of them employed in the neighboring quarries.

Gentisin, gentianin, a substance occurring in the root of *Gentiana lutea,* from which it is extracted by alcohol. Gentianin forms large yellow, silky needles, which sublime between 300° and 400° with partial decomposition. Slightly soluble in water, soluble in boiling alcohol, easily soluble in alkalies; forming a yellow solution. When fused with caustic potash it yields acetic acid, phloroglucin, and oxysalicylic acid.

Gentle, The, a name given to Florence in the palmy days of the Italian republics.

Gentleman, in English law, every man above the rank of yeomen, including noblemen; in a more limited sense, a man who without a title bears a coat of arms, or one who is "a gentleman by reputation," though belonging to some liberal profession or holding some office giving him this rank. In the United States every man of honor and high principles, especially if also well-bred.

Gentleman Commoner, a privileged class of commoners in the English University of Oxford; they wear a special gown and a velvet cap.

Gentleman Usher, a court of England official whose duty it is to usher visitors into the presence of the sovereign.

Gentlemen-at-Arms, a body of 40 gentlemen, headed by a captain, lieutenant, and standard-bearer, whose duties are to form a body-guard to the British sovereign on state occasions. The corps was established by Henry VIII. in 1509, under the name of the Band of Gentlemen Pensioners.

Gentoos, the Hindus in general. Also the Teloogoos or Telugus, a race shown by their language, which was not derived from the Sanskrit, to be of Turanian origin; they inhabit the region N. of Madras near the Bay of Bengal.

Gentz, Friedrich von, a German politician and writer; born in Breslau, Prussia, May 2, 1764. In 1786 he entered the public service of Prussia, but in 1802 exchanged into that of Austria, having a short time previously paid a visit to England. Throughout the struggle against Napoleon he distinguished himself by writings full of burning hatred to the French emperor. At the Congress of Vienna in 1814 he was appointed first secretary, and he held the same post in nearly all the subsequent conferences down to that of Verona (1822). From 1810 onward he labored as an adherent of Metternich. His writings, which are of a miscellaneous character, are distinguished for the elegance and correctness of their style. But his pen was always on sale to the highest bidder; and he drew the supplies by which he met his lavish private expenditure from more than one government outside Austria. He died near Vienna, June 9, 1832.

Genuflexion, the act of bending the knees in worship. There are frequent allusions to genuflexion in the Old and New Testaments, and it would appear that the use was continued among the early Christians. Genuflexion obtains, both by rule and prescription, in various places in the

offices of the Roman Catholic Church, and in the services of the Church of England.

Genung, John Franklin, an American educator; born in Willseyville, N. Y., Jan. 27, 1850; was graduated at Union College in 1870 and Rochester Theological Seminary in 1875; became Professor of Rhetoric (1889) and Literature and Biblical Interpretation (1906) in Amherst College; works include "Tennyson's 'In Memoriam,' its Purpose and its Structure"; "Practical Elements of Rhetoric"; "Hand-book of Rhetorical Analysis"; "Outlines of Rhetoric"; "Study of Rhetoric in the College Course"; etc.

Genus, a class, a kind, a species. In logic, a class of objects containing several species; a class more extensive than a species; a universal which is predicable of several things of different species. In music, sort or class, especially used with reference to scales; as, the diatonic, chromatic, and enharmonic genera (plural). In zoölogy and botany, an assemblage of species or of sub-genera closely agreeing together in all essential characteristics, not found in any others of the sub-family or family to which they belong. It may be divided into sub-genera. Among animals, *Mus* is a genus containing, among other animals, both the domestic mouse and the rat, which differing in size, etc., and being clearly distinct species, have still a community of structure obvious to all. So also among plants, the various species of the rose constitute the genus *Rosa.* In the Latin name of a plant or animal adopted by naturalists, the first word indicates the genus, and the second the species; as, *Mus musculus, Rosa spinosissina.* In other sciences, sometimes a classification like that adopted by naturalists is used. Thus, of skin diseases there is a genus *Acne* with various species, *A. simplex, A. rosacea,* etc.

Genzano (jen-zä′nō), a town of Italy, on the Via Appia, 16 miles S. E. of Rome, near the lake of Nemi. It contains the Cesarina palace, and is noted for its annual flower festival, held on the eighth day after Corpus Christi, which attracts many visitors.

Geocentric, in astronomy, as viewed from or having relation to the earth as center; as, the geocentric latitude or longitude, or what is distinguished from the heliocentric — that is, as seen from the center of the sun. Also having reference to the center of the earth as distinguished from any spot on its surface.

Geocentric Latitude, in astronomy: (1) Of a planet: Its latitude as seen from the earth. (2) Of a place on the earth's surface: The angle included between the radius of the earth through the place and the plane of the equator. It is contradistinguished from geographical latitude, which always exceeds it slightly in amount.

Geocentric Longitude, of a planet, the distance measured on the ecliptic between the geocentric place and the first point of Aries.

Geocerellite (-el′līt), a white, brittle, and easily pulverized mineral, containing carbon 79.24, hydrogen 13.21, and oxygen 7.55=100. Obtained from the dark-brown coal of Gesterwitz. It is also called geoceric acid.

Geocerite, a white waxy mineral, consisting of carbon 79.24, hydrogen 13.13, and oxygen 7.81, from the dark-brown coal of Gesterwitz. Akin to GEOCERELLITE (*q. v.*).

Geode, a term first introduced by German mineralogists to designate a hollow nodule of any mineral substance, often lined with crystals. Thus, at Oberstein, in Saxony, hollow balls of agate were found lined with crystals of quartz or amethyst. Geodes are found more or less in all volcanic rocks; they are occasionally of large size, at other times only of small dimensions. Also the cavity in such a natural ball.

Geodesy (-od′e-si), that branch of applied mathematics which determines, by means of observations and measurements, the figures and areas of large portions of the earth's surface, or the general figure and dimensions of the earth; that branch of surveying in which the curvature of the earth is taken into account. This becomes necessary in all extensive operations.

Geodetic Line, the shortest line on the surface of an ellipsoid which can be drawn between two points. It is a characteristic property of this line that at every point of the curve its curvature is less than that of any other curve of the surface through that point.

Geoffrey of Monmouth, a famous English chronicler; born probably in Monmouth about 1100. He was the author of a famous chronicle or history of the first British kings, often quoted by men of letters, and remarkable for its curious legends. Geoffrey was successively archdeacon of Monmouth, bishop of St. Asaph, and abbot of Abingdon, where he died in 1152 or 1154.

Geoffrin, Madame (zhō-fran′), the holder of a noted Parisian literary salon; born (Marie Thérèse Rodet) in Paris, June 2, 1669. By the grace and vivacity of her manners, aided by a refined and cultivated taste, she drew around her all the fashion, wit and learning of Europe. Early left a widow, with an opulent fortune, her charities to the poor, and her benevolent aids

to literature, endeared her as much to society, as her wit and virtue delighted. She died in Paris Oct. 6, 1777.

Geoffroy St. Hilaire, Etienne (zhō-frwä′ san-tē-lar′), a French naturalist; born in Étampes, France, April 15, 1772. He was educated at the colleges of Navarre and Lemoine, and became a favorite pupil of Haüy. At the age of 21 he obtained the chair of zoölogy in the Parisian Jardin des Plantes. As a member of the Egyptian expedition in 1798 he founded the Institute of Cairo, and returned about the end of 1801 with a rich collection of zoölogical specimens. In 1807 he was made a member of the Institute, and in 1809 Professor of Zoölogy at the Faculty of Sciences. He devoted himself especially to the philosophy of natural history. Among his principal works are: "The Principal of Unity in Organic Composition"; "Philosophy of Anatomy"; "Natural History of the Mammifers"; "Ideas of Natural Philosophy" (1838). He died in Paris, June 19, 1844.

Geoffroy St. Hilaire, Isidore, a French physiologist and naturalist, son of the preceding; born in Paris, Dec. 16, 1805. He devoted himself to natural history, and in 1824 was appointed assistant to his father at the Jardin des Plantes. He was elected to the Academy of Sciences in 1833, and afterward became successively inspector-general of the university, member of the council of instruction, and Professor of Zoölogy at the Academy of Sciences. One of his chief works, "History of Anomalies of Organization in Man and the Animals," adds valuable confirmation to the theories of his father. He was the means of founding the Acclimatization Society of Paris. He died in Paris, Nov. 10, 1861.

Geognosy, a term introduced by Werner to designate the science now termed geology. Also a description of the structure of the earth, as distinguished from geology, limiting the latter term to theoretical speculations regarding the processes by which it has been brought into its present state. This Sir Charles Lyell considered an unnecessary refinement of language.

Geogony, a name sometimes given to the science which investigates the origin of the earth; cosmogony.

Geographical Conquests of the 19th Century. The third century after the discovery of America drew to its close with a veil of darkness still shrouding half the globe from the eye of civilized man. A Strabo or a Ptolemy, if questioned in 1800 as to how much of the earth's surface he could describe with accuracy, would have had to confess that he was quite familiar with only one of the grand divisions, and that one embracing only a tithe of the land of our planet. He might perhaps have claimed that he could make a tolerable map of South America, whose interior had been partly opened up by the zeal of the Jesuit missionaries. It would, however, have been full of great voids representing regions unknown to him. He would have been able also to construct a map of Asia, approximately reproducing its main features, but his outlines would have been merely the framework of blurred and empty pictures. The Himalayas had not been measured — the Andes figuring as the highest mountains on the globe. There was a boundless area within the Chinese empire untrodden by Europeans. In Asiatic Turkey, Persia, and in Afghanistan, in Turkestan, and the Pamir, there were whole regions removed from the ken of cartographers. Scant information existed regarding Japan, Farther India, and the Malay Archipelago; next to nothing was known about Korea, and the interior of Arabia was almost a blank. Australia was still floating as a cloud on the horizon. Most of the lands N. of America had not yet been discovered, and the Antarctic realm had barely been touched.

The accurate knowledge of Africa was limited in the main to a narrow strip along the coast. As for the interior, comprising about one-fith of the earth's land surface, geographical learning had hardly begun to outgrow its mediæval estate. Cartographers had been groping their way amid the confused reports of traders, slave dealers, and missionaries. The feature of Equatorial Africa regarding which the most correct conjecture had obtained for centuries, was the source of the Nile, which river, in accordance with the teachings of Ptolemy and the old Arab geographers, was represented on the maps as issuing from some lakes in the heart of the continent, fed by the Mountains of the Moon. Geographers knew of a great river that flowed by Timbuktu, the Queen of the Desert, and which they called the Niger, a name handed down from the time of the ancients. It had long been supposed that this stream had a W. course and that the Senegal and Gambia formed its delta. A counter theory was that it flowed E. to a large lake, a view based in part on vague reports about Lake Tchad. Still another theory regarded the Niger as one of the great arms of the Nile. The Kongo was known only in the last portion of its interminable course, though as far back as the 17th century the opinion had been entertained that it issued from the same quarter of the continent as the Nile. The Sahara remained untraveled by Europeans, except near its margin, and the great lakes of Africa were known only through tradition or vague report.

In North America, the region between the Mississippi and the Pacific and N. of New Mexico still belonged in great part to

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the realm of fancy. We read in the first American edition of Guthrie's "New System of Modern Geography" (Philadelphia, 1795): "In North America which is chiefly composed of gentle ascents, or level plains, we know of no considerable mountains, except those toward the pole, and that long ridge which runs through the American States, and which is called the Appalachian or Alleghany mountains." British America remained in great part unexplored, and the coast of Alaska had barely been grazed. There were whole regions, like the Adirondack wilderness, included within the bounds of the original States of the American Union, which were still sealed to geographers.

Nearly 300 years after the tracing of the coast line of Africa was completed by the voyages of the Portuguese, the systematic exploration of the interior may be said to have commenced in 1788 with the foundation in London of the African Association, an event which inaugurated a new era in the history of geographical discovery. This society had the good fortune to command almost at the start the services of the intrepid Scotchman, Mungo Park. Before this, it is true, the pioneer of modern African exploration, Sir James Bruce, had made his memorable journey along the Blue Nile, and the ornithologist, Le Vallant, had traveled in the hunting grounds of South Africa. Just before we hear of Mungo Park, the record of discovery also tells of a narrow wedge driven toward the heart of the continent in the journey of Browne from Assuan to Darfur. The African Association assumed for one of its first tasks the unraveling of the mystery of the Niger. The journeys of Mungo Park (who perished in the stream in 1806), of Clapperton and Denham, and of Lander, covering together the period from 1795 to 1830, revealed the course of the river. The French, meanwhile, explored the Senegal and Gambia. At this time English explorers began to push from the Guinea coast into the warlike kingdoms of Ashanti and Dahomey. In 1826 the ill-fated Laing, and in 1828 Caillié, succeeded in reaching Timbuktu, that mysterious seat of Islamism which had for centuries fascinated geographers.

The close of the 18th century was the beginning of a new era in the annals of American exploration. The travels of Alexander von Humboldt between 1799 and 1804 in the basins of the Orinoco and Magdalena, and in the Andes and Mexican Cordilleras, mark an epoch in the history of geography and natural science. His work was taken up and extended to other regions, especially Brazil, by eminent naturalists like Maximilian of Wied, Spix, Martius, Auguste de Sainte-Hilaire, Orbigny, and Pöppig. These had worthy successors in the brothers Schomburgk (British Guiana), Darwin (Patagonia, Tierra del Fuego), Avé-Lallemant (Brazil), Tschudi (Andes, Brazil), Castelnau (Brazil, Bolivia, Peru), and Burmeister (Brazil, Argentina).

By the acquisition of the Louisiana territory in 1803 the United States came into possession of a boundless domain, in great part as far removed from the knowledge of white men as the heart of Africa. An exploring expedition was immediately sent into this *terra incognita* under Lewis and Clark, who proceeded up the valley of the Missouri, crossed the divide of the Rocky mountains, and followed the Columbia down to the sea. The explorations of Pike, Long, Bonneville, Catlin, Nicollet, and Frémont, the opening of overland routes to Utah and California, and the government survey for a Pacific railway made deep rifts in the trans-Mississippi region; but its greatest wonders were to remain enshrouded till the tide of colonization had begun to sweep over the whole area. It was not till 1832 that the Mississippi river was traced to its source by Schoolcraft.

The exploration of the Arctic regions, in the hope of finding a N. water route for the trade with the East, had lost much of its fascination by the 18th century. Russia alone prosecuted it systematically in the course of that century, accomplishing a great work in tracing the coast line of Siberia. About the beginning of the 19th century the idea of a Northwest Passage was revived in England and the dream of reaching the pole began to be entertained. A great and persistent onslaught on the frozen North was inaugurated in 1818. The labyrinth of islands, peninsulas, and ice-bound passages N. of the American continent yielded up its intricacies to the assaults of Parry, the two Rosses, Sir John Franklin (to whose tragic end Arctic discovery owed much of its rapid progress), McClure, Kane, McClintock, and Hayes. The exploration of Arctic British America was prosecuted on land with heroic energy by Franklin, Back, Richardson, Beechey, Dease, Simpson, and Rae. Parry in an attempt to reach the pole in 1827 dragged his sledges over the floating ice fields to the parallel of 82° 45′, eclipsing all previous records by more than a degree of latitude. In 1831 James Clark Ross solved the mystery of the position of the N. magnetic pole, which he located in the peninsula of Boothia. McClure entered the Arctic Ocean thorough Bering strait in 1850, proceeded E., was beset for years in the ice, joined hands in 1854 with an expedition which had come in the opposite direction, and thus carried off the laurels of the Northwest Passage. While a great breach was being made in the Arctic fastnesses, Bellingshausen, Weddell, Dumont d'Urville, Sir J. C. Ross, Wilkes, and others extended geographical discovery into the Antarctic regions.

Geographical Conquests

Ross discovered Victoria Land, with its active volcanoes and in 1842 advanced beyond the 78th parallel. During this same period the cruel depths of Australia, whose coast had been explored by Flinders in 1801–1803, were invaded by Sturt, Eyre, and the ill-fated Leichhardt.

A flood of light was thrown on the geography of Northern and Central Asia in the the first half of the 19th century by the journeys of Ermann, Humboldt, Middendorf, Huc (who entered Lhassa, the holy city of Tibet), and others; while men like Webb, Moorcroft, and Wood scaled the heights of the Himalayas and the Pamir, and reached the head streams of the Indus, Ganges, and Amu Daria. From 1848 Mt. Everest, with the 29,002 feet given to it by the trigonometrical measurement of Sir Andrew Waugh, figured as the highest point on the globe. Among the naturalists who were attracted to the Himalayas, the name of the botanist Hooker stands preëminent. The most distinguished traveler in Southwestern Asia in the early part of the century was Burckhardt, who succeeded in entering the holy places of Mecca and Medina. In 1829 Ararat was ascended by Parrot. In 1832–1833 Alexander Burnes performed his famous ride from India to Bokhara. The travels of Crawfurd and MacLeod in the second quarter of the century dispelled in part the obscurity hanging over Farther India. Between 1835 and 1849 the naturalist Junghuhn explored Java and parts of Sumatra. Among his successors in the Malay Archipelago were St. John and Wallace.

Down to the time of the French Revolution, Europe had hardly dared to cast a covetous eye on the interior of Africa. Portugal, England, and France held sway at a few stations along the coast. The sturdy Boers, near the Cape of Good Hope, alone represented actual colonization by Europeans. The Revolution brought in its train Bonaparte's conquest of Egypt, the first great onslaught on African territory on the part of Christendom in modern times. The consequences of the French domination, brief as it was, were far-reaching in the loosening of Turkey's hold upon that country. Another result of the wars of the Revolution was the supplanting of Dutch dominion at the Cape by that of England. An army of ardent missionaries now made their way into the interior of South Africa. While England was laying the foundations of an empire at this end of Africa, France suddenly invaded the N. and conquered Algeria (1830–1848). A few years before this invasion, Mehemet Ali, Viceroy of Egypt, brought Nubia and Kordofan under his sway. This ambitious potentate, who, for the first time since the days of Saladin, made the aggressive power of Africa felt in another continent, in his rôle of modernizer of Egypt, sent various scientific expeditions to explore the Nile which was now traced almost to the equator. To this period of African exploration belong the travels of Rüppell, the brothers Abbadie, Beke, and Krapf in Abyssinia.

With the middle of the 19th century commences an extraordinary era in the history of geographical discovery. The world begins to close in upon the dark interior of Africa which is assailed on every side, and in the course of a generation the great features of the continent are unfolded almost in their entirety. In 1847 the German missionaries Krapf and Rebmann discovered the snow-capped peaks of Kilima-Njaro and Kenia, near the equator. In 1849 Livingstone discovered Lake Ngami, in the heart of South Africa, at a distance of 1,000 miles from Cape Town. In the course of the next seven years he extended his explorations to the Upper Zambesi, of which mighty stream hardly anything had hitherto been known, followed it up, struck out W. along the edge of the Kongo basin (a circumstance unknown to him), made his way to the Portuguese possessions on the Atlantic, then, turning back, followed the Zambesi down stream, discovered the Victoria Falls, the rival of Niagara, and came to the shores of the Indian Ocean. While Livingstone was drawing a luminous trail across South Africa from sea to sea, Heinrich Barth was lifting the veil from the depths of the continent on the other side of the equator by his extraordinary journeys in the W. half of the Sudan. In the sixth and seventh decades of the century large accessions were made to the knowledge of the Nile basin and the surrounding regions, including Abyssinia, by the travels of Petherick (who explored the basin of the Bahr-el-Gazal), Munzinger, Beurmann, Heuglin, and others. In the meanwhile, the French were pushing into West Africa on the side of Senegambia, Du Chaillu traveled in the country back of the Gabun and through the wilds of the Ogowe, the home of the gorilla and the pygmy Obongo; Burton scaled the peak of Kamerun, and Von der Decken explored what is now British East Africa.

Just as Barth was emerging from the scorching suns of Central Africa, laden with the knowledge of countless peoples, in another continent three equally intrepid Germans proceeded to explore the most elevated region of the globe. The Brothers Schlagintweit crossed the Himalayas and the Karakorum, traversed the lofty plateau of Tibet, and surmounted the Kuenlun, reaching heights to which no traveler had ever climbed.

Soon after Livingstone's traverse of South Africa, the beginning was made of those discoveries which unraveled the most interesting problem presented by the geography of that continent. In 1858 Burton and

Speke dispatched by the Royal Geographical Society in quest of a great reservoir of fresh water which was believed to exist somewhere in the region whence the Nile issued, discovered Lake Tanganyika. Before the close of that year, Speke discovered a still larger lake, the Ukerewe, or Victoria Nyanza, which he assumed to be a reservoir of the Nile, though as yet its outlet remained to be found. To what river system, if any, Lake Tanganyika belonged was a problem which was to wait still many years for a final solution. In 1859 Livingstone came to the shores of a third great lake, the Nyassa, a feeder of the Zambesi. Within the next five years the question of the sources of the Nile was approximately settled by the explorations of Speke, Grant, and Baker. The last named, ascending the river from Egypt in 1864 discovering the lowest of the Nile reservoirs, the Mwutan Nzige, or Albert Nyanza. What Ptolemy had laid down on his famous map 1,700 years before was found to be substantially correct, and the discovery later on of snow-clad mountains near the Albert Nyanza, culminating in Ruwenzori, substantiated what the Greek had taught regarding the Mountains of the Moon.

The problem of the Nile was closely interwoven with that of the Kongo, the greatest mystery that still confronted geographers outside of those presented by the polar regions. The Nile question, indeed, could not be regarded as completely settled till the watershed between the two rivers had been determined. Of the Kongo basin, equal in extent to that of the Mississippi, but a mere fraction was known to the world. A boundless maze of tropical forests and rivers had thus far escaped the eye of Europeans. Geographers were not even agreed as to whether the Kongo issued from the heart of the continent or whether it was not rather in the nature of a coast river. Livingstone applied himself with heroic resolution to the task of ascertaining the parting of the waters that found their way to the Mediterranean and those that flowed toward the Atlantic. In 1867–1868 he discovered the Luapula, the E. head stream of the Kongo, and its two large reservoirs, Mweru and Bangweolo, and in 1871 stood on the banks of the great river that hurries past Nyangwe, but not possessed of the information that would assure him beyond doubt that it could be no other than the Kongo.

During these years wide explorations were made in Central Africa, N. of the equator, by Rohlfs, Nachtigal, and Schweinfurth. Nachtigal, a worthy successor of Heinrich Barth, succeeded in making his way into Wadai, a Mohammedan State in the Sudan, a goal the pursuit of which had cost the lives of two eminent explorers, Vogel (1856) and Buermann (1863).

Geographical Conquests

Schweinfurth penetrated into the cannibal regions W. of the equatorial Nile, and in 1871 came to the Welle, whose W. course convinced him that he had traveled beyond the bounds of the Nile basin.

These journeys were coincident with a remarkable epoch in the geographical annals of America. The explorations of Dall revealed the extent of the Yukon; the mountain systems of the West were explored by Wheeler, Whitney, and Hayden; Powell discovered the grand cañon of the Colorado; Washburne and Hayden made known the marvels of the Yellowstone. The knowledge of British America was at this time greatly extended by the travels of Bell, Selwyn, Dawson, and others. Simultaneously with the exploration of the mountains of North America, the geological structure of the Andes was laid bare by Reiss and Stübel, who ascended the volcano of Cotopaxi to its summit.

While the rest of the world was engaged in prying open the recesses of the continents, the Russians were displaying extraordinary activity in the exploration of their vast Asiatic domain and the regions bordering on it. In the first 15 years of the reign of Alexander II., Semyenov, Valikhanov, Radlov, Ostensacken, Syevertsov, Fedtchenko, and Kaulbars assailed that mighty mountain barrier composed of the Altai, Alatau, Tian-Shan, Alai Tagh, and the Pamir, which shuts off the elevated desert region of Central Asia from the plains of Western Turkestan and Siberia. During the same period Shishmarev, Mattussovski, and Pavlinov penetrated into Mongolia, and Palladius into Manchuria. The Russian advance into Central Asiatic highlands met with a prompt response from beyond the Himalayas, whence Hayward, Shaw, and Forsyth pushed into Eastern Turkestan, while the pundit Nain Singh made a memorable traverse of Tibet.

When Japan and China, soon after the middle of the 19th century, opened their portals to the world, the work of exploration, previously inaugurated by dauntless missionaries and naturalists, proceeded with a new impetus. Great journeys were made in China by Blakiston, Pumpelly, Ney, Elias, Bastian, Cooper, and Richthofen, who belong to the foremost ranks of Asiatic explorers. In the decade beginning with 1861 explorations were made in the Caucasus by Radde, in Northern Arabia by Palgrave, and in Turkestan by Vámbéry and Lagrée, and Garnier traced the course of the Mekong as far up as the Chinese province of Yunnan. Contemporaneous with these travels were the remarkable journeys performed in Australia by Burke and Willis, MacKinlay, Stuart, and Forrest, whose exploits were emulated by Giles and Warburton.

Geographical Conquests

The year 1871 is memorable in the history of geographical discovery for the dramatic episode of the finding of Livingstone by Stanley. The meeting by the waters of Tanganyika was followed by the exploration of the N. end of the lake which was found to have no outlet in that direction. Livingstone then returned to the scene of his recent labors, the Luapula-Lualaba basin. On May 1, 1873, he expired on the shores of Lake Bangweolo which he had discovered and which he had become convinced belonged to the Kongo system. In 1874 Cameron discovered that Lake Tanganyika was connected by an outlet, the sluggish Lukuga, with the river formed by the Lualaba and Luapula. This river (which Livingstone had reached in 1871 at Nyangwe) was found by Cameron to flow at too low a level to admit of its belonging to the Nile system. This fearless traveler was prevented by the hostility of the natives from descending the stream and verifying his belief that it was the Kongo. It was reserved for the dauntless spirit of Stanley to bring the mightiest of African rivers within the ken of mankind. In November, 1876, he embarked at Nyangwe in a fleet of canoes, and performing an unprecedented voyage which twice carried him across the equator, he reached the tides of the Atlantic in August, 1877. And now came the great task of exploring the Kongo tributaries, which enlisted the energies of Stanley, Capello and Ivens, Buchner, Pogge, Wissman, Grenfell, Wolf, Brückner, and Van Gèle.

While the veil was being lifted in this quarter, new light was thrown on the regions W. of the Upper Nile by the travels of Junker, Casati, Gessi, and Lupton, the country between the Ukerewe and the coast was opened up by Fischer, Thomson, and Johnston, the naturalist Emil Holub traveled in the Zambesi region, and the explorations of Brazza between the Ogowe and the Kongo laid the foundations of a new French colony. Between 1878 and 1881 Serpa Pinto made his traverse of South Africa, Oskar Lenz performed a journey from Tangier to Timbuktu and thence to the Senegal, and Matteuci crossed from Egypt to the Gulf of Guinea. At this time began the extraordinary career of Emin Bey (Eduard Schnitzer), administrator, explorer, naturalist, and linguist, in the region of the Equatorial Nile. This heroic commander, the peer of the great Gordon, was cut off for years from the world by the Mahdist uprising, till at last Stanley succeeded in reaching him by way of the Kongo and Aruwimi, an exploit which recalled the days of the Conquistadores. In 1887 the Rudolf lake was discovered by Teleki. In 1889 Meyer reached the summit of Kilima-Njaro.

During the years which revealed the sources of Africa's greatest rivers the exploration of the mighty tributaries of the Amazon was prosecuted by Chandless. A little later Crevaux won laurels in the same field, and to him succeeded Karl von den Steinen and Ehrenreich.

The decade which witnessed the solution of the Kongo problem, the last great mystery that had remained hanging over the equatorial zone, was marked by renewed activity in Arctic research. The passage leading N. from Baffin bay, beginning with Smith sound, appeared to promise access to an open polar sea, the theory of whose existence had been put forth by Kane. The American expedition under Captain Hall in 1871 proceeded up this channel, and the splendidly equipped British expedition under Sir George Nares in 1875 followed in its wake; but Kane's theory was not verified. Some of Nares' men in 1876 reached the parallel of 83° 20′, eclipsing Parry's record by more than half a degree. Lieutenant Lockwood of the ill-starred Greely scientific mission in 1883 made a farther gain of four minutes. In 1873 the Austrian expedition of Weyprecht and Payer discovered Franz-Josef Land. In 1878–1879 Nordenskjöld immortalized himself by accomplishing the Northeast Passage.

While Stanley and his successors were opening up the exuberant forest realm of Equatorial Africa, the arid expanse of Central Asia, stretching from the Pamir on the W. to the highlands of Manchuria on the E., and embracing the desert of Gobi (Shamo), the Tarim basin, with the Takla Makan desert, and the ranges of the Tian-Shan, Kuenlun, Altyn Tagh, and Nan-Shan, was attracting the most intrepid explorers from all parts of the world. This illustrious roll includes the great Przhevalski (whose name is borne by the former town of Karakol, in Turkestan, where he died in 1888); Sosnovski, Mushketov, Kostyenko, Potanin, Regel, the pundit Krishna (who removed the long-existing doubt regarding the identity of the Sanpo and Brahmaputra), Pyevtsov, Bell, Bogdanovitch, Roborovski, Carey, the brothers Grum-Grzhimailo, Rockhill, Younghusband, Bonvalot, and Henry of Orleans. These had distinguished successors in the last decade of the century in Dutreuil de Rhins (murdered by the Tibetans in 1894), Littledale, the young Swedish geologist Sven Hedin, Obrutchev, Futterer, Holderer, and Deasy. Among the host of ardent explorers who have traveled in China since 1875 are Sosnovski, Baber, Gill, Széchényi (son of the great Hungarian patriot, Count Stephen Széchényi), Kreitner, Easton, Hosie, Colquhoun, Henry, and Younghusband. It is only since 1880 that the geography of Korea has emerged from its obscurity.

In the last quarter of the 19th century the dimensions of the unknown in Alaska, the Northwest Territories, and Labrador

were vastly reduced by the explorations of Muir, Allen, Schwatka, Dawson, Ogilvie, Russell, Low, and others. In 1888 the first crossing of Greenland's great ice cap (in its S. part) was accomplished by Nansen. In 1892 Peary and Astrup made a sledge journey of more than 1,000 miles over the N. end, and determined the extension of the island in that direction. In 1893–1895 the gap between the North Pole and the highest latitude ever before reached (Lockwood's 83° 24′ in 1883) was bridged almost half over by Nansen's drift voyage and sledge journey, which carried him to the parallel of 86° 14′. This record was eclipsed in 1900 by the expedition of the Duke of Abruzzi, which reached 86° 33′. The results of these expeditions render it improbable that any extensive land mass remains undiscovered within the Arctic Circle. As the physical conditions prevailing at the North Pole cannot be materially different from those observed in the near vicinity, the reaching of the pole itself may now be regarded as a goal belonging to the realm of adventure rather than to that of scientific discovery.

In the same year in which Peary and Astrup crossed the fathomless ice cap of Greenland the gigantic glaciers of the Karakorum were explored by Sir William Martin Conway, who climbed to an elevation of about 23,000 feet, eclipsing the record of all former travelers. In 1897 Aconcagua, probably the loftiest peak of the Andes, was scaled to its summit by Zurbriggen, the Swiss guide, and Vines, the geologist of Fitzgerald's expedition, the elevation obtained for it by barometric measurement being 23,080 feet. In 1898 Conway accomplished the ascent of Illimani, one of the rivals of Aconcagua.

At the close of the 19th century the attention of the world was once more turned, after a long interval, to the Antarctic regions. The British expedition under Borchgrevink succeeded in locating the S. magnetic pole, and attained to the parallel of 78° 50′, surpassing by 40′ the "farthest south" achieved by Ross in 1842. Within the Antarctic Circle remains by far the greatest unknown area on the globe. Outside of the polar realms the physical map of our planet, barring minor details, is nearly complete. When the 19th century opened geographical science had half a world to conquer. At its close this conquest may be said to be well-nigh achieved.

LOUIS HEILPRIN.

Geography (from the Greek *ge*, earth, and *grapho*, I write), the description of the earth, of the condition of our globe. The earth may be considered as a world, in relation to the other worlds; or as a body of different parts, properties, and phenomena, which at the same time is inhabited by beings of different natures; or as the residence of free moral agents among whom its surface is divided and through whose influence it undergoes many changes. Geography, therefore, is commonly divided into mathematical or astronomical, physical, and political. The two first, taken together, are also called general geography.

Mathematical or astronomical geography has for its object the determination of the form and dimensions of the earth and its relations with the celestial bodies; it treats of the earth's motion and the laws by which that motion is governed, together with the phenomena of the movements of other cosmical bodies on which depend the succession of day and night, the seasons, and the eclipses and occultations of the sun, moon, and planets; of the mode of determining the position of places on the earth's surface and of representing any portion of that surface on maps or charts; of the construction of globes and other instruments necessary for the solution of astronomical problems and the modes of solving such problems. Most of these topics belong as much to astronomy as to geography.

Physical geography describes the principal features of the earth's surface, as consisting of land and water; the extent and configuration of the continents and islands; the elevation and direction of the mountain chains; the conformation of the plains and valleys, their altitude above the sea level; the soil, climate, and animal and vegetable productions of the different countries. It embraces also the various phenomena of the ocean, the inequalities of its depth, saltness and temperature, the direction and velocity of currents, the tides; of inland waters, as rivers, lakes, etc. It also comprehends many of the topics usually treated under meteorology and climate; the mean temperature of different countries; the height of the snow-line; the prevailing winds; the quantity of annual rain, of evaporation, etc.; and the effect of all these circumstances on the animal and vegetable world and on the human race.

Political geography embraces, in the first instance, the description of the political or arbitrary divisions and limits of empires, kingdoms, and states; and in the second, that of the laws, modes of government, and social organization which prevail in the different countries. The details of this branch of the subject will be found under the names of the various countries, cities, and towns.

The earliest idea of the earth formed by mankind seems to have been that it was an immense disk, in the center of which their own land was situated, surrounded by the ocean, and covered by the sky as with a canopy. The Phœnicians were the first people who made any great progress in extending the bounds of geographical knowledge. They seem to have explored all the

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shores of the Mediterranean, and at an early period to have passed the Pillars of Hercules (the Strait of Gibraltar), and visited to some extent the Atlantic shores of Europe and Africa, extending their voyages as far N. as Great Britain and as far S. as the Tropic of Capricorn. What knowledge the Hebrews had of distant lands was probably acquired from the Phœnicians. In the Bible the remotest places mentioned are, to the N., Gomer (Gen. x.), probably the Kimmerii of Herodotus, and Kir, the Caucasian region of the Kur; to the E., India (Esther i.); to the S., Cush (Ethiopia), Ludim or Lubim (Libya), Sheba, and Ophir, probably a place in South Asia; to the W. Tarshish, supposed by some to have been Tartessus in Spain, by others Carthage. So rapid was the advance of geographical knowledge between the date of the Homeric poems (which may be regarded as representative of the ideas entertained about the commencement of the 9th century B. C.) and the time of Hesiod (800 B. C.), that while in the former the earth is supposed to resemble a circular shield surrounded by a belt of water which was the source of all other streams, and the names of Asia and Europe applied only, the former to the upper valley of the Cayster in Asia Minor, and the latter to Greece N. of Peloponnesus, Hesiod mentions parts of Italy, Gaul, and Spain, and is acquainted with the Scythians and with the Ethiopians of South Africa.

The first attempt to enlarge the circle of geographical information by an exploring expedition was made by Neku or Necho II., King of Egypt, about 604 B. C. He sent down the Red Sea a fleet manned by Phœnicians, which, in the third year, after having circumnavigated Africa, returned to Egypt by the Pillars of Hercules. On their return the explorers asserted that during a part of the voyage, when sailing from E. to W. they had the sun on their right hand, that is, in the N. This statement, which shows that they must have sailed to the S. of the equator, Herodotus, who relates this extraordinary voyage, naturally discredited, but to modern science it is the best proof that the voyage actually took place. The 7th and 6th centuries were memorable for the great advance made in regard to the knowledge of the form and extent of the earth. Thales and his pupil Anaximander, reputed to have been the first to draw maps, exploded many errors, and paved the way by their observations for the attainment of a sounder knowledge. Of the maritime expeditions of the Carthaginians there is but one of which we have any authentic account — that of Hanno, which took place about 580–570 B. C. With a fleet of 60 vessels he passed the Strait of Gibraltar and sailed down the coast of Africa as far as the Gulf of Benin, or according to others, no farther than the Nun river. The history of Herodotus (born 484 B. C.) gives us a complete representation of all that was known of the earth's surface in his age. The world was believed to be bounded to the S. by the Red Sea or Indian Ocean, and to the W. by the Atlantic, while its E. boundaries were conjectured to be nearly identical with the limits of the Persian empire, and its N. termination somewhere in the region of the amber lands of the Baltic, which had been visited by Phœnician mariners, and with which the people of Massalia (Marseilles) kept up constant intercourse by way of Gaul and Germany.

The Indian expedition of Alexander the Great (330 B. C.) greatly enlarged the ancient knowledge of Northern and Eastern Asia. He penetrated to the Hyphasis, the modern Sutlej, the extreme E. and most important of the five rivers which flow through the Punjab. The ambassadors of Seleucus, one of his successors, visited the city of Palimbothra, which was probably on the site of the modern Allahabad. Beyond this the Greeks seem to have known little or nothing of Eastern Asia. About 320 B. C. Pytheas, a seaman of Massalia, sailed along the W. coasts of Spain and Gaul, visited Britain, and, pursuing his voyage, discovered an island henceforward famous as Ultima Thule, which is supposed to have been Iceland. An important advance in the science was made by Eratosthenes (276–196 B. C.), who first used parallels of latitude and longitude and constructed maps on mathematical principles. He considered the world to be a sphere revolving with its surrounding atmosphere on one and the same axis and having one center. He believed that only about one-eighth part of the earth's surface was inhabited, while the extreme points of his habitable world were Thule in the N., China in the E., the Cinnamon coast of Africa in the S., and Cape St. Vincent in the W. The "Geography" of Strabo, written about the beginning of the Christian era, embodies all that was known of the science at that period. The countries lying round the Mediterranean were known with tolerable accuracy, but the Atlantic shores of Europe were very vaguely comprehended, while of the N. and E. portions the most erroneous notions prevailed. Nothing whatever was known of Scandinavia, Russia, or Northern Germany, nor of Siberia, Tartary, China, Japan, or the great Asiatic Archipelago. The Caspian was thought the limit of the earth to the N., and to be connected with the Eastern Ocean by a sea occupying the space now known to be covered by Siberia and Tartary. Of Africa only the N. part was known, S. of which was supposed to be an uninhabitable torrid region.

The next famous geographer we come upon is Ptolemy, who lived at Alexandria

about the middle of the 2d century A. D. At this period the Roman empire had reached its greatest extent, and all its provinces had been surveyed and were well known. Large advances had been made in the knowledge of the countries lying beyond the empire. The idea of a circumambient ocean had been abandoned, and an indefinite expanse of terra incognita substituted. Africa was represented as stretching indefinitely S., and was even carried round to join the E. of Asia; so that the Indian Ocean was inclosed like the Mediterranean. In Europe, Spain and Gaul were now correctly delineated, together with the S. shores of Britain. The outline of Scotland and the relative position of Ireland are very incorrectly given. Thule is laid down as an island about 100 miles long, and from its position it is probable some part of Norway was meant. Northern Germany and the S. shores of the Baltic were pretty well known, as also some portion of Russia in the neighborhood of that sea, and the S. part of European Russia. In Asia it was considered certain that there were wide regions inhabited by nomad tribes called Scythians, while from the far E. came some vague reports of China.

From the time of Ptolemy up till the 13th century no advance was made in geographical knowledge, and his statements were everywhere unquestioned till the records of Marco Polo opened up new fields of inquiry. The account of his travels first made known to Europe the existence of Japan and of many of the East Indian islands and countries. But Marco Polo had unfortunately made no astronomical calculations, nor had he mentioned the length of the longest day at any given place; hence the celebrated school of Nuremberg geographers, having no certain data for estimating the extent of countries which he had traversed, incorporated on their globes and maps their own rough estimates of the length of his days' journeys; and, taking Ptolemy as their basis, they represented Asia as having its E. shores in the region of the Antilles. These calculations misled Columbus to suppose that by sailing 120° W. he would reach the wealthy trading marts of China, and the result of this conviction was the discovery of the New World (1492). From this time forward the progress of discovery was extremely rapid. In 1497 the Cape of Good Hope was doubled by Vasco da Gama, four years after its discovery by Bartholomeu Diaz. Within 30 years from the date of the first voyage of Columbus the whole of the E. coast of America from Greenland to Cape Horn had been explored and Spanish keels were plowing the Pacific. In 1520 Magellan passed the straits which bear his name, and his vessel, crossing the Pacific and Indian Oceans, returned to Europe by way of the Cape of Good Hope, being the first that had circumnavigated the globe.

The W. coast of America was explored as far as the Bay of San Francisco about the middle of the 16th century, and considerable progress was made by the Spaniards in acquiring a knowledge of the interior of South America. At the same time discovery in the E. advanced with rapid strides. Within 20 years of Gama's arrival in India the coasts of East Africa, Arabia, Persia, and Hindustan had been explored and many of the islands of the great archipelago discovered. The desire to reach India by a shorter route than those by the Cape of Good Hope or Cape Horn led to many attempts to find a Northwest Passage, which, though they failed in their object, materially enlarged our knowledge of the Arctic regions. The expeditions of Willoughby and Frobisher in 1553 and 1576, of Davis in 1585, of Hudson in 1607, and of Baffin in 1616, were the most important in their results toward this end. By the middle of the 17th century the Dutch, under Tasman and Van Diemen, made the Australasian islands known to the world. Late in the following century Captain Cook made strenuous efforts to discover the Southern continent, which was thought necessary to balance the Northern one, and though unsuccessful in his aim, added largely to geographical knowledge by his survey of the Pacific and its innumerable islands. The Antarctic continent was at last discovered in 1840 by American, English, and French expeditions under their respective commanders Wilkes, Ross, and Dumont D'Urville; and to crown the list of oceanic discoveries, the Northwest Passage was found by McClure in 1850. Hearne, Mackenzie, Back, Franklin, Richardson, Lewis, Clark, and Frémont deserve mention as explorers of North America; Humboldt, Spix, and Martius, von Tchudi, Schomburgk, among those of the South American continent. In Asia numerous travelers and geographers have contributed much to render our knowledge certain and precise in respect to most parts of the continent. The interior of Australia was in some measure explored by Stuart, Eyre, and Leichhardt; in 1860 the island was crossed for the first time from Melbourne to Carpentaria by Burke, Wills, and King, and in 1861–1862 by McDouall Stuart from Adelaide to the Indian Ocean; while many exploring journeys have since been made. In Africa a host of travelers have struggled in defiance of a deleterious climate and hostile natives to penetrate the mystery which has long enveloped that great division of the globe.

Geological Survey, United States, a bureau of the Interior Department created for the purpose of preparing a map of the United States, classifying the public lands, examining the geological structure, mineral

resources, and the products of the country. To these duties have since been added those of investigating the extent to which the arid lands of the West can be redeemed by irrigation, segregating the irrigable from the non-irrigable lands, and the selection of sites for reservoirs and canals for the purposes of irrigation. The maps made by the Geological Survey are all on a large scale, and have a degree of accuracy and a minuteness in detail incomparably greater than ordinary maps. The smallest scale is 1-250,000, or about 4 miles to the inch, and this scale has been employed for regions of the West which are thinly settled, and where the topography is mountainous. But it has been superseded by scales of 2 miles and 1 mile to the inch, the latter for populous regions with slightly or moderately diversified topography, like Massachusetts and New Jersey. The maps are engraved on sheets which, with the 4-mile scale, embrace 1° of lat. and 1° of lon. The 2-mile maps embrace tracts of half the above linear or one-fourth the areal dimensions; the 1-mile maps embrace one-fourth of the above linear and one-sixteenth the areal dimensions. The topography is represented by "contours" or "grade curves"; *i. e.*, by lines of equal altitude above the sea. The contour intervals are uniform for each sheet, but vary in different sheets according to the character of the country. In some tracts the contour intervals represent a difference of elevation of 200 feet, these being in very mountainous countries, while in flat countries and on large-scale sheets they may be as small as 20 feet. The general construction and methods of all maps are, however, the same.

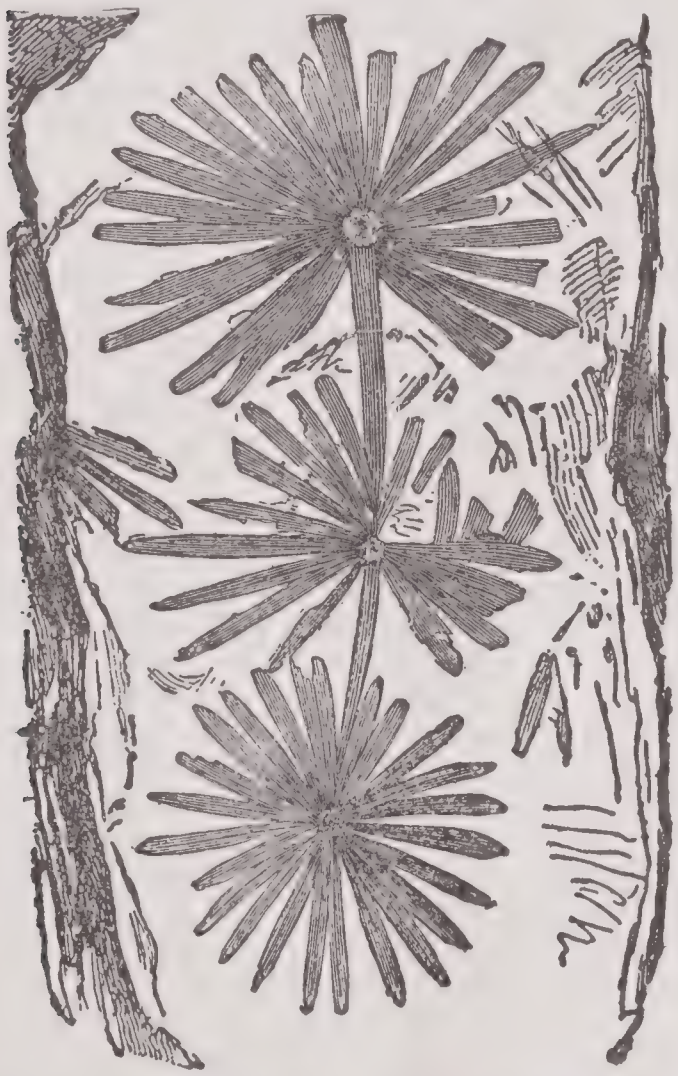
There are three principal branches of the geological survey: (1) Geology proper; (2) Topography; (3) Irrigation surveys. The geological branch investigates the stratigraphy, the geological structure and history, the lithology, mineralogy, and palæontology, the ores and mines, and in general the natural economics, resources, and physical geography of the country. The topographic branch prepares the maps; the irrigation branch investigates the possibilities of irrigation and selects the irrigable lands and sites available for reservoirs and canals. The work of the topographic branch is the basis of the work of the other two, and all the results of the latter are projected on the maps. The publications of the Survey are (1) the annual report of the director, which, besides the administrative report, contains memoirs on geologic subjects by members of the survey, and is distributed according to the regulations of the Interior Department; (2) monographs on the leading subjects of special investigation by the geologists; (3) bulletins on more limited special subjects of research; (4) an annual volume of mineral statistics. The last three are distributed gratuitously only to designated libraries and to learned corporate societies, which send their own publications in exchange. Otherwise they are sold by the director at 10 per cent. above the cost of publication, and the money deposited in the Treasury.

Geology, the science which investigates the bygone history of the earth with the view of accounting for its present condition. It inquires into the successive changes which have taken place in the organic and inorganic kingdoms of nature, seeks out the causes of these changes, and traces the influence which they have exerted in modifying the surface and the external appearance of the earth.

History.—Though it was only during the 19th century that geology has started up into the vigor of manhood, yet its birth took place ages ago. Isolated geological observations or hypotheses occur abundantly in ancient literature. "As for the earth, out of it cometh bread; and under it is turned up as it were fire" (Job xxvii: 5); an anticipation of the Huttonian hypothesis. Egypt, according to Herodotus, is the gift of the Nile, that is, the river brought down the silt which constitutes the fertile soil of the delta and other parts of Lower Egypt. Though there is a mixture of erroneous hypotheses in the statements attributed to Pythagoras, in Ovid's "Metamorphoses," bk. xv., other parts would have done no discredit to Sir Charles Lyell. Pythagoras himself lived, it is thought, about 580 B. C., but the views handed down by Ovid were probably those of Pythagoreans in the Augustan age rather than those of Pythagoras. The best geologist of antiquity was the geographer Strabo, who lived in the 1st century A. D. Modern geology began with Werner, who was a professor in the School of Mines at Freiberg, in Saxony, in 1775. He believed that a series of universal formations had been deposited in succession from a chaotic fluid. Basalt was supposed to have had the same origin, but to this view various continental observers were opposed. Hutton published in 1788 his "Theory of the Earth," developed in a separate work in 1795. He assumed no causes but those now existing. He showed that geology and cosmogony were different. "In the economy of the world," he said, "he could find no trace of a beginning, no prospect of an end." He held basalt, granite, etc., to be of igneous origin. The Wernerians were called Neptunists, their opponents Vulcanists. In 1798 Cuvier published his "Fossil Bones," which gave a great impulse to palæontology.

Forces or Causes in Operation.—After inquirers had outgrown the belief in fossils produced by the plastic power of nature or

all entombed simultaneously by the Noachian deluge, the belief was entertained that there had been a series of creations and catastrophes, the latter causing the universal destruction of all preëxisting species. The belief was also entertained that some external causes, say the forces producing earthquake and volcanic action, were more potent in former times than now. This Professor Huxley calls catastrophism, which he defines to be any form of geological speculation which, in order to account for the phenomena, supposes the operation of forces different in their nature or immeasurably different in power from those



FOSSIL PLANT FROM COAL MEASURES OF PENNSYLVANIA.

which are at present in action in the universe.

The second school of geology is that called by Huxley uniformitarianism. This looks only to causes now in operation for the explanation of geological phenomena. Of this school Hutton was the founder, though it was Sir Charles Lyell that carried it forward to triumph. He showed the enormous changes which the causes now in operation are still producing, and that nearly every phenomenon attributed to abnormally potent causes acting suddenly and briefly could be produced by causes not more intense than those in action now, but operating through immense periods of bygone time. In his "Principles of Geology," he examines aqueous causes, the action of water acting in connection with tides, currents, etc., in seas, rivers, and lakes, also the action of ice in all its forms. Next he inquires into igneous causes, volcanoes, and earthquakes. Climate and organic life are also carefully investigated in the work.

The doctrine of the third school of geologists is called by Professor Huxley evolutionism; it accepts nearly the whole of uniformitarianism, except the part referring to the development of organic life. In his later years Sir Charles Lyell became an evolutionist. See DARWINIAN THEORY; EVOLUTION.

Geologic Time.— Both the uniformitarian and the evolutionist believe that they may draw to any extent on what may be called the bank of time, which will be found "ready to discount any quantity of hypothetical paper." Sir William Thomson holds that any such drafts must be limited "within some such period of time as 100,000,000 years"; and another natural philosopher considers the time at call only about 60,000,000 years. Huxley believes the necessity for these limitations is not proved, though perhaps one, two, or three hundred millions of years might be enough to account for geological phenomena.

With regard to the subdivision of the time, long or short, at the geologist's command, the sedimentary strata having been laid down by water, the relative thickness of each stratum will measure the proportion of geologic time required for its deposition.

Geologic strata.—The geological record is made up as follows, beginning with the five great

PERIODS.

5. Quaternary. The age of man.
4. Cenozoic Period. Age of Mammals.
3. Mesozoic Period. Age of Reptiles.
2. Palæozoic Period. { Age of Coal Plants. / Age of Fishes. / Age of Invertebrates.
1. Archæan Period. Lifeless and dawn of life.

The following list gives the eras together with their dependent series and sub-divisions in descending order:

ERAS AND SERIES.

9. Quaternary or Post Tertiary: (3) Recent, (2) Champlain, (1) Glacial.
8. Tertiary Era: (4) Pliocene, (3) Miocene, (2) Oligocene, (1) Eocene.
7. Cretaceous Era: (4) Laramie, (3) Colorado, (2) Dakota, (1) Lower.
6. Jura-Trias: (b) Jurassic; (3) Purbeck, (2) Oölite, (1) Lias, (a) Triassic: (4) Rhætic, (3) Upper, (2) Middle, (1) Lower.
5. Carboniferous Era: (3) Permian, (2) Carboniferous, (1) Sub-carboniferous.

4. Devonian Era: (5) Catskill and Chemung, (4) Portage, (3) Hamilton, (2) Corniferous, (1) Oriskany.
3. Upper Silurian: (3) Lower Helderberg, (2) Onondaga, (1) Niagara.
2. Lower Silurian: (3) Trenton, (2) Chazy, (1) Calciferous.
1. Cambrian.
Eozoic (dawn of life), Azoic (lifeless).

SUB-DIVISIONS.

9. Quaternary: Pleistocene; 8, Tertiary: English Crag, Upper Molasse, Rupelian and Tongrian of Belgium; 7, Cretaceous; Upper Chalk, Lower Chalk, Chalk Marl, Gault, Neocomian, Lower Greensand; 6. Jura-Trias: Wealden, Purbeck, Portland, Kimmeridge, Oxford Oölites, Lower or Bath Oölite, Lower Lias, Marlstone, Upper Lias, Kössen beds, Dachstein beds; Alpine Trias, in part; Keuper, Muschelkalk, Bunter-Sandstein; 5. Carboniferous: Magnesian Limestone, Lower Red Sandstone, or Rothliegendes, Upper Coal Measures, Lower Coal Measures, Millstone Grit, Lower Carboniferous, Mountain Limestone; 4. Devonian: Old Red Sandstone — Catskill Red Sandstone, Chemung, Portage, Genesee Slate, Hamilton beds, Marcellus Shale, Upper Helderberg, Schoharie, Grit, Oriskany Sandstone; 3. Upper Silurian : Lower Helderberg, Onondaga Salt Group, Salina beds, Water Lime, Niagara Group, Wenlock Group, Clinton Group, Medina Sandstone (Upper Llandovery); 2. Lower Silurian: Hudson River beds, Cincinnati Group, Lower Llandovery, Utica Shales, Trenton Limestone, Caradoc and Bala Limestone, Black River Limestone, Chazy Limestone, Calcifer, ous Sandrock, Magnesian Limestone, Lower, Middle and Upper Cambrian; 1. Archæan: Laurentian, Huronian.

Other Rocks.—For these, see IGNEOUS ROCKS: VOLCANIC ROCKS.

Fossils.— For these see FOSSILS: PALÆONTOLOGY.

Applied Geology.—Geology applied to industrial or other practical purposes; as, for instance, to mining, drainage, railway tunneling, etc.

Geomancy, a kind of divination by means of lines formed by little dots or points, originally on the earth, and subsequently on paper, etc.

Geometric Chuck, a chuck having a radial slider to which the work is attached, the slider oscillating in a plane at right angles to the axis of motion, so as to produce curved lines in various patterns, as regulated by special devices.

Geometry (Greek *ge*, earth, and *metron*, measure), as its name implies, is primarily the mathematical science which has for its object the measurement of portions of the earth's surface. According to the Greek historians geometry originated in Egypt from the necessity of measuring off portions of the land, or of readjusting the boundaries of landed property after the inundations of the Nile. Since that epoch its scope has been widely extended; the measurement of small detached portions of territory falls within the province of land surveying, while the measurement of the surface of the globe in a more extended sense has become the object of geodesy. These two sections of the science have each their special importance and present difficulties which have not failed in attracting the attention of eminent geometricians, such as Legendre and others; they may now, however, be considered but applications of the general science.

Geometry according to the present meaning of the word may be defined as the science whose object is the consideration of the relations of magnitude and of position or form of any conceivable portion of space. Thus the principal object of geometry is the study of the relations which must exist between the parts of the same definite figure, that is, constructed, or supposed constructed, according to a given law, and the comparison together of figures so constructed.

The relations between the parts of the same figure may be of two kinds — of position or of magnitude; for example, two points are in a straight line, four points on the same circle; two straight lines are perpendicular to one another, a straight line is tangent to a circle or asymptote to a hyperbola, a circle is the osculating circle to an ellipse; those are relations of position. On the other hand, the proportionality of homologous lines of two similar figures, the equality of the square constructed on the hypothenuse of a right-angled triangle to the sum of the squares constructed on the sides containing the right angle, that of the rectangles constructed on the segments of two chords which cut each other in the interior of a circle, that of the volumes of two pyramids on equal bases of the same height, are relations of dimensions. But the relations of position govern the relations of dimensions, and vice versa; that is, the one set of relations depends on the other.

Thus it is because a triangle is rectangular that the square constructed on one of its sides is equivalent to the sum of the squares constructed on the other two, and vice versa, that relation between the magnitudes of the squares on the three sides depends on the triangle being right angled. The geometer may draw indifferently from the study of a figure either the knowledge of the relations of position or that of the relations of dimension, on the condition that he knows how to apply relations of the one kind to those of the other; and the principal aim of geometry is to examine into the connection between the relations of magnitude and those of position.

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The investigation of these relations may, at first sight, appear very complicated, since the figures may vary *ad infinitum;* but in reality this difficulty does not present itself, because when figures are classified according to the laws on which their construction depends the elements of the figures compared are always the same.

Method in Geometry.— The general problem of geometry admits of four distinct cases — passing from one relation of position to another, passing from a relation of position to a relation of magnitude, passing from a relation of magnitude to one of position, and passing from one metrical relation to another. The second and third questions may be considered solvable without difficulty; the first and the fourth alone present each time fresh difficulties specially belonging to the proposed figure and to the nature of the desired transformation; it is in those two problems alone that art and a special skill become necessary to the geometer; we will therefore pass over the two others without remark. The fourth question is simpler than the first, as it is always more precise and more circumscribed; at least it is always approachable, since it is reducible definitively to eliminations. But in addition to the investigation of the simpler means for effecting the eliminations presenting great difficulties which art alone can overcome, at times the pure algebraic methods fail completely and the geometer must adopt another method, as we shall soon see. The first question is the most difficult, as it admits of a greater indetermination.

Invention may result from investigations respecting questions of the first and fourth kind; but in the latter case the progress realized amounts in most cases just to having obtained the precise expressions of laws, the existence of which was forseen, and of which the form was unknown. In the first, on the other hand, the gain consists in the discovery of new laws which might occasion the creation of new chapters in the science. For example, the theories of tangents, of asymptotes, of singular points, of osculating curves, etc., are related to questions of the fourth kind; the methods of transversals, of homology, of reciprocal polars, etc., spring from speculations on questions of the first order.

Whether the geometer proposes to himself to pass from relations of position to other relations of position, or from relations of magnitude to others of the same kind, he has always the choice of two methods. In the first place he may try to attain his end by combinations of concrete ideas interpreted by transformations of figures, or he may at once substitute for the given relations of position the relations of magnitude which they involve, then transform these relations of magnitude by algebraic processes, and return from the last metrical relations to the corresponding relations of position. In the second case he may limit himself to effecting, if possible, the definite algebraic transformations which will serve his purpose, or he may pass back from given relations of magnitude to corresponding relations of position, then transform these last relations in view of the object to be attained, and at last repass from the last observed relations of position to corresponding relations of magnitude. In other words, instead of keeping exclusively to the points which the very terms of the question display, the geometer may in every case substitute a question of the second kind for one of the first, and vice versa, and take as intermediate two questions of the second or of the third class which present no difficulty. In the first case a question of algebra is substituted for a question of geometry; in the second it is the reverse: a question of pure geometry is replaced by a question of analytic geometry, or the reverse. These transformations, in constant use, are justified; in the first case the purpose is to substitute difficulties admitting of a methodical solution for others over which the operator would be powerless without inspiration; in the second the intention is to substitute, if possible, for a tedious labor of elimination, ingenious combinations of concrete enunciations. It may be easily conceived that this last mode of transformation may present imemnse advantages, a very simple enunciation often taking the place of very complicated formulas, and the bringing together of two similar enunciations might give rise to valuable views which algebra might not have evolved so easily.

Divisions of Geometry.— Geometry may be conveniently divided into six principal sections — elementary geometry, the geometry of mechanical curves, practical geometry, analytic geometry, infinitesimal geometry, and descriptive geometry.

Elementary geometry comprehends two parts — plane geometry, the object of which is the study of the simplest figures formed on a plane by straight lines and circles, and geometry of three dimensions, which treats of straight lines and planes considered in any relative position whatever, of figures terminated by planes, of the cylinder, of the cone, and of the sphere. Plane geometry is subdivided into two branches; in the first the study rests on the means of ascertaining the equality and inequality between two figures or of verifying the definite relations of position, and the end in view is the knowledge of the elements which may serve to define the figures and the means of constructing these figures. Thus, for example, we may study in this first part the conditions of equality of triangles, the conditions of perpendicularity or of parallelism of

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two straight lines, the conditions of contact between a circle and a straight line in order to construct a definite triangle on sufficient data, to draw a perpendicular from a given point, or a parallel to a given straight line, or a tangent to a given circle. The first part is concerned with the very existence of figures and the transformations to which their definitions can be subjected. The second part of plane geometry has for its object, on the one hand, the comparison of areas of polygonal surfaces with each other and with the area of a circle; and on the other the establishment of relations of magnitude corresponding to the simplest relations of position.

Geometry of three dimensions is likewise subdivided into two branches having the same objects as those which compose plane geometry, the only difference being in the nature of the figures.

It is of importance to remark that the elementary geometry of the moderns is distinguished from that of the ancients by two marked characteristics. On the one hand, while the Greek geometers could recognize the equality between the areas of two plane figures or between the volumes of two bodies taken from among those the study of which is comprised in the elements, they never proposed to themselves to obtain anything analogous to that which we call the measurement of a surface or of a volume. Their geometry remained entirely theoretical, while ours trenches on the practical. On the other hand, they never evolved, from the ascertained simple relations between the surfaces and volumes which they had compared, the more complicated relations which exist between the linear elements of these surfaces or volumes; the two things, however, have an intimate connection. We make this remark because if it were not kept in view it would be impossible to account for the efforts which have been necessary to constitute analytical geometry.

Geometry of Curves.—The geometry of curves, which were called by the ancients mechanical, because they could only be constructed by the aid of instruments more or less complicated, has disappeared, being absorbed in analytical geometry. It comprehended specially the study by elementary processes of the principal properties of conic sections.

Analytical Geometry.—Though the curves studied by the ancients did not present themselves without a real order, since their invention sprang from felt wants, still no connection existed between these curves, nor was there any means of establishing one, so that the study of one was of no value to that of another. Indeed identity, even when it existed, might be far from established, for one curve a little complicated possessed an infinite number of totally different properties, admitted consequently of an infinite number of definitions, the relation between which might be often very difficult to perceive. Analytic geometry arose from the necessity of introducing order and method into the investigations previously pursued without a settled plan and without sufficient preparation. The principles of this new geometry are so simple that a few words are all that is needed to explain them.

Every definition of a curve comprises in itself the indication of the processes to be followed in order to construct that curve by points, that is, to obtain successively points as numerous and as closely brought together as is necessary in order to lay down the curve. The process always consists in reproducing any number of times some definite figure the dimensions of which depend on an element variable at will. For each value of that element the figure takes a determinate form, and the prepared constructions always end in the determination of a particular point which is one of the points of the curve. When the variable element changes the point found changes also, and if it is supposed that that element increases continuously at the same time the corresponding point is continuously displaced, and describes the proposed curve. The principal inconvenience of ancient definitions of curves was that each definition of the curve, given from one of its many properties, led to a new moving or changing figure, such as has just been described. The mere verification of the identity of a curve defined in several different ways presented insurmountable obstacles; and finally, the theories of a curve naturally resulting from the study of the law of deformation of the various moving figures which could produce it were as numerous as the modes that could be conceived for its generation. The preliminary study, always laborious, of the moving figure had on each occasion to be recommenced. The first question in introducing the analytic method was then to fix on some types, between which could then be chosen, according to the cases, the moving figures which should serve to construct every curve by points. Now, the position of a point on a plane depends on two elements, and giving one of these elements was giving a line on which the point should be found. Giving two elements which determine a point, is then giving two lines which would intersect each other, that is to say, the figure to be constructed in order to obtain the point. That, however, is only one side of the question. The moving figure which generates a curve, remaining always the same, the law of deformation of that figure, that is to say, the mere definition of the curve, can be nothing else than a relation between the two elements, always the same,

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which determine each point. The curves will then be defined by equations, and the study of these curves will be simply the study of their equations.

The two elements chosen to fix the position of a point are called the coördinates of that point. We may have an infinite number of systems of coördinates, but in each system the definitions of every curve are comparable, the study of these curves depends on similar investigations and can be prepared for beforehand by the preliminary establishment of general formulas, furnishing completely calculated solutions of the principal simple problems, which by their various combinations form all the special questions which may have to be approached. That being granted, the method may be easily imagined. In the first place, a curve presenting itself under any definition whatsoever, if it is brought into relation with the adopted system of coördinates, and if in that first operation whatever is variable is left indeterminate, we shall have the most general equation for the curve in that system, that is to say, its typical equation, so that if at another time the curve is represented under another definition in investigating its equation in the same system of coördinates, particularized so as to simplify as much as possible the calculations, it will suffice to compare the particular equation with the general one to verify the identity of the curve, to give it its name, and to know all the properties of it which have been studied previously. Thus, in the first place, the identity of the same curve will always be easily recognizable, no matter what the definition may be. On the other hand, it will be easy to put into relation any two curves connected with the same system of coördinates. In fact, the most elementary relation between curves is the relation of intersection; now, the simultaneous representation of two curves in the same system of coördinates furnishes directly the means of finding the points where they meet. In fact, the coördinates of the points where two curves meet, satisfying at once both their equations, are found by the algebraic elimination between the equations. Thus the most general question which the study of curves will admit of is reduced to the most elementary analytical difficulty. The special study of solutions, furnished according to the various cases by the systems of equations for two curves, will, besides, render evident the more intimate connection which these two curves may have.

This being granted, it now remains for us to trace the path which is to be followed in the institution of the new geometry. We commence by establishing the formulas of transformation necessary for changing the bases of the system of coördinates. These formulas will admit of the recognition of the different forms which the equation of one curve might take if the bases of coördinates were altered, and consequently they aid in the choice on each occasion of those bases which will best suit the investigation we have in view, with which we shall arrive at the simplest form of the equation of each curve. As the straight line and the circle are destined on every occasion to be put in relation to the most complicated curves so as to throw the properties of those curves into relief, we must reconstruct in the system of coördinates adopted the complete theories of these two lines, that is to say, we must previously establish the formulas of the solutions of all elementary problems which are connected with the straight line and circle. These preliminaries being completed, we pass to the special study of curves represented by the simplest equations. These curves, if the system of coördinates has been well chosen, will themselves be the simplest and consequently the most usual, and thus the most useful to be known. All we have just said may be applied without difficulty to geometry of three dimensions, that is, the geometry of surfaces. Three elements are necessary for determining the position of a point in space; the coördinates of a point will thus be three in number; a surface will be represented by an equation between the three coördinates of one of its points, and a line will be represented by the system of two equations between the three coördinates.

Infinitesimal Geometry.— Under this denomination we comprehend the geometrical investigations which cannot be approached but by methods furnished by the infinitesimal calculus. This geometry is simply a continuation of the analytical geometry of Descartes, of which it may indeed be said it forms a part; the difference consists simply in the nature of the questions which are no longer within the exclusive province of elementary geometry, and of the theory of equations between finite magnitudes, but require the use of the infinitesimal calculus. The questions which it embraces are of two kinds — those which spring from the differential calculus and are related to the contacts of various orders which may exist between two curves or two surfaces, and those which form the applications of the integral calculus, and have for object the measurement of magnitudes, the elements of which being incessantly variable cannot be summed by finite parts.

Descriptive Geometry.— This branch of general geometry does not, properly speaking, form part of the pure science. It is rather a particular art, of great value to practical geometers but in theory of comparatively little importance. The principal aim of descriptive geometry makes up for the want of a picture or diagram in three

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dimensions by the association of two diagrams in two dimensions. These diagrams, usually formed in two planes at right angles to each other, receive the orthogonal projections of the points of space, and as the two projections of a point determine the position of that point in space, the descriptive mode of representation fulfils at once the two essential conditions for defining the object and are only applicable to it. It is but proper to remark, however, that descriptive geometry fails, and necessarily fails, in means for directly representing the very objects of geometry of three dimensions, namely, surfaces. It is to the illustrious Monge that the science of descriptive geometry is due; for though engineers and architects must long have employed the method, imperfectly, no doubt, and perhaps unconsciously, and though in this sense the ancients were acquainted with it, yet it was reserved for Monge to lay down clearly the elementary principles of the science and to compile a complete treatise on the subject.

History of Geometry.— We think it advisable to divide the history of this science into 11 periods, distinguished one from the other either by the changes which arose in the methods adopted or by the nature of the investigations pursued. We shall therefore follow the chronological order, and as we proceed we will sketch successively and separately the history of all the branches of the science. The first period begins with Thales and ends with Plato; the second reaches from Plato's time to that of Euclid; the third carries us on to Hipparchus; the fourth to Menelaus and Ptolemy; the fifth to the extinction of the school of Alexandria; the sixth stretches from the revival of learning in Europe to Vieta; the seventh closes with Kepler; the eighth with Descartes; the ninth with Newton; the tenth with Monge, and the eleventh includes the geometers of the present day.

First Period.— The origin of geometry is lost in the mists of antiquity. The notions of perpendicularity and of parallelism; the conditions of the equality of triangles; the most elementary properties of the circle, relative to its diameters, to its chords and its tangents, and the primary notions of the sphere, must have been familiar to the Egyptians; but if Thales taught them, according to current belief, how to calculate the height of an obelisk by the length of its shadow, their knowledge of geometry did not reach farther than those intuitive notions which are the mere result of attention. The history of the science, for us at least, must commence with Thales (639–548 B. C.). To that philosopher (born in Phœnicia, afterward the founder of the Ionian school at Miletus) is attributed the remark which forms the basis of the theory of similarity of figures, that is, that the sides of equiangular triangles are proportional. It may well be believed that Thales had no precise ideas except on simple relations, being able to express himself only in whole numbers; but geometry itself furnished the means of arriving at more general notions in this respect. Immediately following him in point of time came Pythagoras (born about 580), who had been his disciple and who founded his celebrated school in Italy, where geometry was as highly honored as philosophy. The invention of the theorem of the square of the hypothenuse, for which the science is indebted to him, had probably been preceded by at least the study of the simple relations between the areas of triangles and of parallelograms, relations which, when the consideration of incommensurable ratios are put aside, are perceived almost intuitively. The discovery of the fundamental property of the right angled triangle completed, so to speak, the geometry of polygons. The theory of regular polygons took its rise at the same time in the same school, which probably got so far as the comparison of volumes of parallelopipeds, at least in the simpler cases, since the problem of the duplication of the cube had been stated.

Second Period.— Archytas, one of the successors of Pythagoras, from whom Plato received the first elements of geometry, forms the natural link between the first and second periods. Of the problem of the two proportional means, which Hippocrates of Chios, celebrated for his lunulæ, had related to the duplication of the cube, he gave a solution more theoretical than practical, which rested on the consideration of the curve of intersection of a cylinder and of a torus. Plato and his disciples, Menechmus and Eudoxus, gave solutions of the same problem, much more simple, by the intersections of conics or even of mechanical curves more complicated, and found the theory of geometrical loci, which in the Athenian school took the name of transcendent geometry; and the analytical method which Theon has thus defined: to regard the thing sought as the thing given, and to go from consequence to consequence till the thing sought is recognized as true; that is, to suppose the problem resolved and infer, on the hypothesis that the imposed conditions are fulfilled, the consequences which result from it, in order to obtain in a practical form the relations of the figure which contains the data to that which comprises the unknown ones. Dinostratus, brother of Menechmus, imagined at the same time his celebrated quadratrix for the division of an angle into any number of parts proportional to given lines, and for squaring the circle. The results of the investigations of the geometers of Plato's school on conic sections were collected and arranged by Aristæus in a work in five books, which

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was highly esteemed by the ancients but which has not come down to us. Viviani has attempted to restore it from information derived from Pappus, under the title "De locis solidis secunda divinatio geometrica in quinque libros injuria temporum amissos Aristæi senioris geometræ" (Florence, 1701). We must also mention, as falling within this period, the works on elementary geometry written by Hippocrates of Chios, and by Leo, Theudius of Magnesia, Hermotimus of Colophon, Eudoxus, and Theætetus, which those of Euclid cast into oblivion, but which existed in the time of Proclus.

Third Period.— This period comprehends the names of the three greatest geometers of antiquity — Archimedes, Apollonius, and Euclid. Besides the geometry which we owe to the last-mentioned philosopher, we have from him the "Data," which form a sequel to the "Elements," and designed to facilitate its use by the resolution of the problems. He has also left behind him four books on "Conic Sections," two books on "Loci," which probably treated of the surfaces engendered by the revolutions of conics on their axes, and three books on "Porisms." None of these last-mentioned works are extant. The "Elements" of Euclid are to this day a model of the form of demonstrations and the association of theorems. History records in this period, firstly, a complete theory of incommensurable relations, and secondly, the effective construction of roots of equations of the second degree. The theorem of the lunulæ of Hippocrates, establishing an exact connection between two surfaces, the one terminated by a curvilinear outline and the other by a rectilinear one, had raised sanguine hopes, from which sprang persevering investigations relative to the squaring of the circle. Of course the problem was insoluble, but the ignorance of that time as to the incomparability of incommensurables of different origins prevented them from perceiving the impossibility of obtaining a solution of the problem by means which they felt bound exclusively to employ. Investigations continued to be made in the same direction without gain of ground till Archimedes appeared. It is well known that that geometer solved the problem in the only shape in which it can be solved, and extended his method to the squaring and cubing of the cylinder, the cone, and the sphere.

We may remark simply on this subject that Archimedes appears to be the first geometer of antiquity who caught a glimpse of the double significance as to proportionality and as to numerical equality of the formulas which enunciate the theorems of geometry relative to the comparison of areas. Just as Euclid had said, "Two rectangles have between them a compound ratio of the sides," and not what was only said five or six centuries later: "The measure of a rectangle is the product of the measures of its sides"; so Archimedes said: "The circle is equal to the rectangle whose base is the half-circumference and whose height is the radius," and not, "The measure of the circle is the product of the measures of the half-circumference and the radius." But without further innovating respecting the form to be given to the enunciations in the dogmatic exposition of the science, Archimedes well knew in these special cases how to interconnect the numerical values of the elements of the figures. It was thus he arrived at the approximate value $\frac{2}{7}$ of the relation of the circumference of a circle to the diameters. Half a century after, Aristarchus of Samos made another step in advance in this direction in attempting to ascertain the relations of the distances of the sun and moon to the earth by the knowledge of the angle subtended at the earth by the distance between the sun and moon, seen when the angle at the moon is right in the triangle which has its angular points at the centers of the three spheres. Archimedes also devoted himself to numerical speculations, as may be seen from his "Arenarius." The neighborhood of the school of Pythagoras, with which it is to be supposed he must have had some communication, would perhaps explain this peculiarity in a geometer of that age. However that may be, to him can be traced back the invention of logarithms, which is clearly indicated in the book we have just mentioned. The other works of Archimedes on geometry treat of the squaring of the parabola and the cubing of the segments of the paraboloid, of the ellipsoid, and of the hyperboloid of revolution, problems incomparably more difficult than any previously attacked, and from which might have sprung 20 centuries earlier than it did, the infinitesimal analysis, had algebra been made independent of geometry.

Scarcely had Archimedes disappeared beneath the ruins of Syracuse when Apollonius arose in Alexandria and earned an almost equal renown in a different branch of the science. Archimedes had completed that branch, the object of which is the comparison with each other of magnitudes of the same nature; Apollonius made an analogous progress in that which treats specially of the properties of figures. His eight books of "Conics," in which he considers those curves in the oblique cone, which had not been done till that time, contain almost all their interesting properties, those which relate to their foci, tangents, asymptotes, or diameters, and to their involutes. This great work, of which only the first seven books are extant, procured for its author the name of *The* Geometer. We have also from him "De sectione rationis"; of his

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other treatises, "De sectione determinata," "De tactionibus, "De inclinationibus," and "De locis planis," we have no knowledge except that derived from some notes in the commentaries of Pappus. Apollonius had been preceded several years by Eratosthenes, director of the library of Alexandria under the third Ptolemy, and who had left a highly esteemed work entitled "De locis admetiatis," now lost; the only extant treatise of his being one on the duplication of the cube.

Fourth Period.— This period, which corresponds to the most brilliant era of astronomy, offers but a single discovery in the domain of geometry, yet one of immense importance, the discovery of trigonometry. None of the works of Hipparchus have been preserved, but the "Almagest" has revealed the numerous and extensive hints which Ptolemy has borrowed from them; and according to Delambre whose testimony can scarcely be questioned on such a subject, it is to Hipparchus that are due almost all the methods of calculation adopted by the ancient astronomers. We may remark in a historical point of view that the trigonometry of Hipparchus is very far from corresponding with the methods afterward applied by Vieta for solving by algebra the determinate problems of geometry. Then it had only to do with a problem entirely special, as Hipparchus and Ptolemy only employed right-angled triangles, and as to the numerical calculation of chords of different arcs, it constituted only a more extended application of the method taught by Archimedes for the valuation of the approximate ratio of the circumference of a circle to the diameter. To Geminus, another geometer of this period, are attributed by Proclus two works no longer extant, one relating to the spiral, the other entitled "Enarrationes geometricæ," which probably was a history of the science. Perseus, several years later in date than the preceding writer, wrote a work on the sections of the torus, which is also lost; Theodose has left, under the titles "Sphæricorum libri tres," "De habitationibus," and "De diebus et noctibus," three elementary works on the sphere, the climate, and the inequality of days and nights, which have rather a closer connection with astronomy than geometry.

Fifth Period.— The geometrical science of this period was enriched by (1) the celebrated theorem of Menelaus relative to the six segments determined on any transversal on the sides of a triangle, a theorem, which was long attributed to Ptolemy. It formed in the "Spherics" of Menelaus the basis of the fundamental theorem of spherical trigonometry, and was reproduced for the same purpose by Ptolemy; it has since become in the hands of Carnot the starting-point of the beautiful theory of transversals; (2) of the theorem which Guldinus laid claim to, and which has been found in the "Mathematical Collections" of Pappus; (3) the theorem relative to the four segments of any transversal by four fixed straight lines issuing from the same point; this theory of the constancy of the ratio of the distance relations of points of intersection of the transversal with two of the four straight lines and point of intersection with the other two, has since become in the hands of Chasles the starting-point of a new theory of conics; (4) the theorem relating to the six segments intercepted on a transversal by the four sides and the diagonals of any quadrilateral; (5) the theorem to which the *hexagrammum mysticum* is reduced when the system of two straight lines is substituted for any conic; and (6) the theorems which have, in the hands of Desargues, led to the theory of involution. All these theorems, which are perhaps due to Pappus, are very remarkable, and as we have just shown were called on to play an important part in the domain of science. As belonging to this period we may further cite the identification of the sections of the cone and of the cylinder, by Serenus, the generation of the ellipse by the movement of a point of a straight line of always the same length, gliding between two fixed straight lines, conceived by Proclus; and the invention of the cissoid by Diocles, for the resolution of the problem of the two proportional means. But of these inventions, those of Pappus were almost premature, as at that time they served no end; and the others were simply additions of little value to the labors of the geometers of the two preceding periods.

What makes this period remarkable is, perhaps, the work of Diophantus and of his disciples, more especially of Hero, the author of the oldest treatise on land surveying. Diophantus has been regarded simply as an arithmetician or algebraist. We look on him as the forerunner of Vieta, the inaugurator of the greatest revolution which has been produced in method; not that we ascribe true genius to that remarkable man, but because, without foreseeing it, and, doubtless, still more without intending it, he has powerfully contributed to establish the identity, now evident, but then little suspected, between the functions of geometric origin, the fourth proportional and the mean proportional, and the functions of arithmetrical origin, the product or the quotient and the square root. It has not been sufficiently noted that the enunciations of the arithmetical and algebraic problems which Diophantus has treated are, so to speak, derived from the enunciations of the problems of geometry contained in the "Elements" of Euclid, and arranged almost in the same order. Diophantus was the model on which the Arabic algebraic

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geometers, Leonard of Pisa, Tartaglia, Cardan, and finally Vieta, at first formed themselves. He was thus the connecting link between the ancients and the moderns. It must be remarked, however, that though Diophantus may have had some sort of a presentiment of the revolution which was about to be accomplished, he by no means carried it to the final issue; that honor must be ascribed to Hero of Alexandria, whose treatise on land surveying contains the rules for the measurement of the areas of polygons, and, above all, the formula for the area of a triangle as a function of its sides, a formula the mere existence of which proves that the revolution was achieved, and that algebra and geometry had now become definitely allied. We are not quite certain of the date that must be assigned to this Hero, who is called the Elder, to distinguish him from another Hero called the Younger, who also belonged to Alexandria. We believe he lived about the 6th century; Chasles placed him in the 2d century before Christ, which is evidently a gross mistake.

Sixth Period.— This period extends from Hero to Vieta. After the sack of Alexandria and the burning of its library by Omar, the science sought refuge in India, or rather it confined itself to that country, for it existed there in the time of the Greeks. Brahma-Gupta followed Hero at an interval of about a century, and he is the first and most illustrious representative of the Indo-Arabic school. His works have only been known to the Europeans within these last few years. They were for a long time forgotten by the Hindus. On comparison with the old Arabic geometrical works, we discover that the latter have borrowed largely from them. Geometry is not treated of directly in them; what of it they do contain is disseminated in the chapters devoted to arithmetic and algebra; but it is precisely that association which forms their principal characteristic. In those remarkable works are found not only the formulas for the area of the triangle, and for the radius of the circumscribed circle as a function of the three sides of the triangle, but also those (which appear there for the first time) of the area of a quadrilateral inscribed in a circle as a function of its four sides, of its diagonals, of the heights of the triangles of which it is composed, and of the diameter of the circumscribing circle.

Seventh Period.— This period is almost entirely represented by Vieta. The development of the methods of application of algebra to geometry was long and painful. Vieta crowned the work of 15 centuries; but *tantæ molis erat.* that Vieta only succeeded in giving an uncouth form to the demonstrations of the elementary rules of algebraical calculation applied to the concrete magnitudes. His algebra was born and died with him. It was to Descartes that the honor of putting the finishing touches to the work was reserved. He did so in a few lines in the opening pages of his geometry. To Vieta geometry owes many improvements; he simplified trigonometry considerably, and to him are due the majority of the elegant formulas which now constitute it. It was he who first resolved the problem of the three spherical triangles where the three sides are given; this problem, never presenting itself in the practice of astronomy, had been neglected by the Arabic philosophers. He explained the multiplicity of the solutions of the problems of trigonometry, and connected with the trisection of the triangle or the duplication of the cubes all the cases of the equation of the third degree, which, in the "Ars Magna" of Cardan, rose to an immense number. He constructed also the roots of the equation of the fourth degree, and gave the first geometrical solution of the problem of the circle tangent to three others. And, to conclude, it is to him we owe the treatise "De tactionibus," which he restored under the title of "Apollonius Gallus."

Eighth Period.— This period comprehends three great names, those of Kepler, Galileo, and Cavalieri. The undying renown of Kepler and Galileo has been acquired by the former chiefly in speculative astronomy, and by the latter in physical astronomy, in physics, and dynamics. Yet the labors of Kepler in the regions of pure geometry have been of some importance. His "Stereometria doliorum" (solid measurement of jars), a strange enough title certainly, contains the first applications among the moderns of the method of "Exhaustions" of Archimedes, freed from the difficulties which had encumbered the geometry of the Greeks. Kepler found by this method the volumes engendered by the revolution of a conic round a straight line parallel to one of its axes. We must also remark that his method for graphically representing the circumstances of an eclipse have a striking similarity to the processes of descriptive geometry. Galileo is only known as a geometer from his invention of the cycloid. The supremacy in this period belongs to Cavalieri, whose method for quadratures and cubatures, published in 1635 under the title "Geometria indivisibilibus continuorum nova quadam ratione promota," is entirely new. The "Exercitationes geometricæ," which appeared in 1647, contain the demonstration of the famous theorem of Guldin and the solution of the problems which Kepler could not solve.

Ninth Period.— In the period filled up by the immortal labors of Descartes, Fermat, Roberval, Desargues, Pascal, Huyghens, Wallis, and Barrow, analytical geometry arose, and the era of modern geometry

opens. The methods of tangents and maximums of Fermat and Barrow, and the theory of involutes of Huyghens, which point to the discovery at a close date of the differential calculus, the processes for summation of Roberval, Pascal, and Wallis, which point in the same way to the integral calculus; and the descriptive inventions of Desargues, which bring us more closely to the present epoch. This period in the history of geometry may at least be compared with that of Archimedes, Apollonius, and Euclid. We need not again here refer to the labors of Descartes, but simply mention the analytical method which he has given for tangents in his "Géométrie," and his geometrical method for the same problem relatively to the cycloid, and more generally to every epicycloid, the method which has since become the foundation of the theory of the instantaneous center of rotation. The theory of involutes of Huyghens was a fresh step toward the infinitesimal calculus. He was led to treat of it in connection with his researches in mechanics; thus it is found inserted in his great work on the pendulum, "De horologio oscillatorio." Huyghens employed it specially in the solution of the problem of the cycloidal pendulum.

Tenth Period.—This period, which extends from Newton to Monge, is certainly the most brilliant of all in the general history of mathematics; it occupies, however, but a secondary rank in that of geometry. The principal gains to the science were the method of isoperimeters of the brothers Bernouilli, the theorem of Newton on the generation of curves of the third order, and the remarkable theorem of Maclaurin on the attraction of an ellipsoid, the theory of curves of double curvatures of Clairaut, and the theory of the curvatures of surfaces of Euler.

Eleventh or Present Period.—This period, which commences with Monge, is one of the most brilliant in the whole history of the science. The other two principal names which inaugurate the period are those of Carnot and Poncelet. The beginning of it is characterized by an innovation, the boldness of which would have appalled the two preceding generations, the introduction of imaginary quantities into geometry, the realization of these symbols, and their adaptation to practical uses. The remainder of it down to the present day has not been long enough to exhaust the treasures discovered through its introduction. In fact, instead of exhausting them, we have seen the whole science revolutionized by the improvements in power that the use of imaginaries has given. Progress in this new order of ideas has been made through well marked stages. Monge, without even thinking of realizing the imaginaries, introduced into analytical geometry the fertile principle of contingent relations. Carnot, who appears to have closely attacked the problem of the construction of imaginary solutions, failed completely; but the luminous philosophical appreciation which he had made in his "Géométrie de Position" of the method of interpretation of negative solutions, fixed pretty clearly the terms of the question, and plainly indicated the path to be followed in order to reach a speedy solution of this question. Besides, the putting of the question was a great step; it freed the intellect from an inveterate superstition. General Poncelet, more timid than Carnot in his way of putting the question, solved it, though scarcely avowing it to himself, and hardly daring to employ it in the problems which are constructed by the intersection of curves of the second degree. At last, M. Marie, embracing it in its widest generality, gave the definite solution of it. Carnot's first contribution to geometrical science was his principle of the correlation of figures, a principle which, having been farther generalized, is now known as the principle of continuity. His second contribution was his theory of transversals. On these inventions is founded modern geometry, which has revolutionized the science, and has given us generalized conceptions which were previously undreamed of.

Geophagism, or **Dirt-eating,** the practice of eating some kind of earthy matter, clay, chalk, etc., common among uncivilized peoples, such as the South American Ottamacs, the Indians of the Hudson bay country, the West Indian blacks, the negroes in some of the United States of America, etc. In some cases it is probably used to allay hunger, but it is also practised where the supply of food is sufficient. Among chlorotic young women a similarly depraved appetite is not uncommon.

George, a division of the W. province of Cape Colony, on the S. coast, E. of Cape Town. It contains 2,600 square miles, and about 11,000 inhabitants. It is valuable chiefly for its pasturage and its timber. The town of George stands 6 miles N. of the coast, and has a population of over 2,000. on the coast is the port of Mossel bay.

George, Henry, an American political economist; born in Philadelphia, Pa., Sept. 2, 1839; received a common school education; went to California in 1859; worked as a newspaper compositor for a number of years; became an editor in 1867, and later was connected with several California periodicals; removed to New York city in 1880. He was nominated by the Labor Party for mayor of New York in 1886; received 67,000 votes; but was defeated. In 1897 he was again nominated for mayor by several organizations united under the name of the "Democracy of Thomas Jefferson." Though urged to use caution against overwork, he began the campaign with great

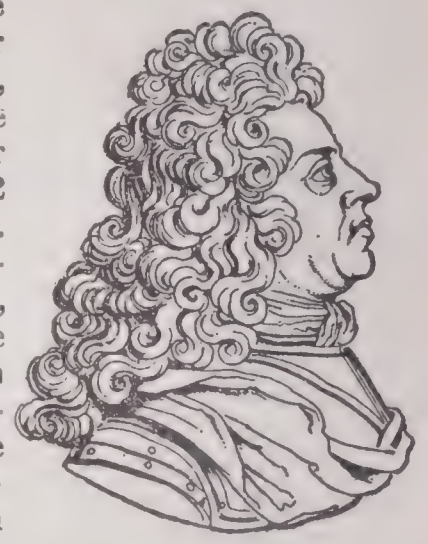
enthusiasm. During the night of Oct. 28, he made four addresses and retired about midnight, but soon had a stroke of apoplexy and died before morning. His publications include "Progress and Poverty" (1879); "The Land Question" (1881); "Social Problems" (1883); "Property in Land"; "Protection and Free Trade" (1886); etc.

George, surnamed "The Bearded," Duke of Saxony; born Aug. 27, 1471. He was the son of Albert the Brave, the founder of the Albertine line of Saxony, and succeeded, in 1500, to the hereditary dominions of the Albertine house. Later on he became involved in the turmoils of the Reformation period. He was not at first wholly hostile to reform, but thought that it could be better effected by means of papal edicts than by the revolt of Luther. Accordingly he became embittered by the uncompromising tone of Luther's later writings, and endeavored to suppress the Reformation in his dominions by violent measures. These, however, were unsuccessful, and in 1539, on the accession of his brother Henry, who was a Protestant, the Reformation was introduced into the dominions of the Albertine house of Saxony. He died April 17, 1539.

George I., King of England; born in Hanover March 28, 1660. He was a son of Ernest I., first Elector of Hanover, and of the Princess Sophia, granddaughter of James I., King of England, and succeeded his father in the electorate, in 1698. On the death of Queen Anne, in 1714, he was called to the throne of England, as the nearest heir in the Protestant line, and this was the beginning of the English dynasty of Brunswick. In the internal politics of the country he gave his support to the Whigs, and was prudently neutral as regarded the Continental wars of his time, yet he joined the Triple Alliance of 1717, and the Quadruple Alliance of 1718 against Spain. He had as premier, Sir Robert Walpole, whose genius repressed all attempts at disorder, and nullified the efforts of the so-called Pretender, James III. Unfortunate in his family relations, George was obliged to divorce his wife Sophia of Zell, charged with an intrigue, and imprison her in the castle of Ahlen, where she ended her days in 1726, after a confinement of 32 years. He died in Osnabruck, June 11, 1727.

KING GEORGE I.

George II., King of England, son of the preceding; born in Hanover, Nov. 10, 1683. He succeeded his father in 1727. He retained as his prime minister the celebrated Sir Robert Walpole, who preserved the country from war during the first 12 years of his reign. After the dismissal of Sir Robert, he undertook some expeditions which resulted disastrously. In the war of the Austrian Succession he declared himself on the side of the Empress Maria Theresa, and against France. His armies, successful at Dettingen (1743), failed signally at Fontenoy (1745), and at Laffeld (1747), but the campaign was closed by the treaty of Aix-la-Chapelle (1748). Meantime, however, his throne had been strengthened by the victory of Culloden, gained over Prince Charles Edward Stuart and his adherents in 1746. War having in 1755 again broken out on the continent of Europe, England experienced fresh reverses in Germany and lost her Hanoverian dominions, but these losses were more than compensated by brilliant and valuable conquests in the East Indies, and in America. George was the founder of the British Museum. He died in London, Oct. 25, 1760.



KING GEORGE II.

George III., King of England, son of Frederick Louis, Prince of Wales; born in London, June 4, 1738. He succeeded his grandfather George II., in 1760. In the early part of his reign he gained brilliant successes over France and Austria in the Seven Years' War, and in 1763 concluded an advantageous peace. In 1764 George Grenville succeeded to Lord Bute as premier, and began those measures in relation to the American colonies the consequences of which proved so momentous; and the American Stamp Act was passed the following year. After a long and fruitless war, the independence of the United States was acknowledged. In 1782 Lord Shelburne was placed at the head of the State, with Mr. Pitt, son of the Earl of Chatham, as Chancellor of the Exchequer. In 1783 the memorable coalition ministry between Mr. Fox and Lord North was formed. To this the king was decidedly hostile; and as soon as Mr. Fox's India bill had been rejected by the Lords he sent a message to him

and Lord North, commanding them immediately to return him their seals of office. On the following day Mr. Pitt became prime minister; and the firmness which the king had displayed in the affair, and the intrepidity with which he opposed the coalition, gained him considerable popularity. In 1789 the king was afflicted with mental aberration, which lasted from the beginning of November till the following February. A war with revolutionized France now appeared inevitable; and the views of his ministers met with the king's full concurrence. In 1798 public distress appeared to have reached its climax, and the Irish rebellion broke out. In 1800 the Act of Union between Great Britain and Ireland was passed; and in order to bring those over who opposed the measure, the ministers allowed a tacit understanding to prevail that it would be followed by certain political concessions. George, however, could never be persuaded that he could admit the Catholics to political power without violating the spirit of his coronation oath — the consequence of which was the retirement from office of Mr. Pitt and his colleagues in 1801, and the formation of a new ministry headed by Mr. Addington. Negotiations were now speedily entered into which led to the treaty of Amiens. The king, however, consented to it with great reluctance; and when the resumption of hostilities took place in 1803 there was an evident demonstration of public satisfaction throughout all ranks. The Addington administration proved incompetent to their task, and Mr. Pitt, in 1804, again took the helm of State; but he died in 1806, and the Grenville party, which Fox had joined, went into office. In 1807 Lord Grenville and his colleagues attempted to change the king's opinions with regard to Catholic emancipation; but George was inflexible, which led to the ejection of the Fox and Grenville party, and the Perceval administration succeeded them. The death of his youngest and darling child, the Princess Amelia, which happened toward the close of 1810, gave the king a shock from which he never recovered. The insanity which already more than once had visited him returned and assumed a violent character. The remaining years of the king's life are little more than a blank, and he died in Windsor, Jan. 29, 1820.

George IV., King of England; born in London, Aug. 12, 1762. He succeeded his father George III. in 1820. Though he had at first declared for the Whigs, he for a long time gave himself up to Tory influence, and had as his prime ministers Lord Liverpool and the Duke of Wellington. During his regency occurred the final overthrow of Napoleon. He caused the passage of numerous laws against the liberty of the press, and had incessant troubles in Ireland to put down. In 1823 he again took sides with the Whigs, and selected as premier the celebrated George Canning. In 1829, the bill granting Catholic emancipation was passed. George IV. married, in 1795, the Princess Caroline of Brunswick, whom he afterward caused to be tried before the law courts on a charge of adultery, in regard to which the most generally received opinion is that it was baseless. He left behind him a most disreputable character for morality, and his treatment of his wife probably intensified the popular dislike which his habits had first engendered. He died in Windsor, June 26, 1830.

George V. (George Frederick Ernest Albert), King of Great Britain and Ireland and Emperor of India; born in London, June 3, 1865; second son of King Edward VII. He entered the navy as cadet June 5, 1877, spent two years on the training ship "Britannia," and then accompanied by his brother, the late Duke of Clarence, started on a three years' voyage around the world on board the "Bacchante." In 1883 he was made a midshipman on the "Canada," stationed off the North American coast, and in 1885 was promoted to lieutenant, having passed his examinations with distinction. He was made commander in 1890 and opened the Jamaica Industrial Exhibition. In 1891 he visited Ireland with the Duke of Clarence, and, on the latter's death in 1892, became heir to the throne and took his seat in the House of Lords as Duke of York. He was married to the Princess Victoria Mary of Teck, at St. James' Palace, July 6, 1893, the ceremony being attended by the King and Queen of Denmark, the Czarewitch and other illustrious foreign guests. In 1901 he was promoted to rear-admiral, and appointed colonel-in-chief of the Royal Marine Forces. On Jan. 22, 1901, by the death of Queen Victoria, he succeeded his father as Duke of Cornwall, and with the Duchess made a tour of the colonies, opening the first Parliament of the Commonwealth of Australia, and returning in November. He was given the title of Prince of Wales and Earl of Chester on the king's birthday, Nov. 9, 1901. On the death of his father, May 6, 1910, he succeeded to the throne under the title of George V.

George I., King of the Hellenes; born in Copenhagen, Dec. 24, 1845. He was second son of the King of Denmark. In 1863 he was elected king by the Greek National Assembly. In 1867 he married the Princess Olga, a niece of the Russian czar. His conduct as a constitutional monarch was always correct and regular, and he won the popular sympathies by the efforts he made on behalf of the expansion of Greek nationality. His children were bred in the Greek faith.

George, Duke of Clarence, and brother of Edward IV., King of England. He espoused the cause of Henry VI. and his queen, Margaret of Anjou, against his brother and sovereign. Some years afterward he was accused of having sought the hand of Mary, Duchess of Burgundy. He subsequently married a daughter of the Earl of Warwick (the "king-maker"), and joined him in his revolt against the royal authority. Being taken prisoner, he was condemned to death. The unfortunate prince, being allowed to choose the mode of his death, is said to have drowned himself in a butt of Malmsey wine in 1478.

George Eric Lancaster. See MACKAY, GEORGE ERIC.

George, Lake, called also **Horicon,** a beautiful lake, 32 miles long, near the E. border of New York State. It forms the head-waters of Lake Champlain, is studded with hundreds of picturesque islands, and its shores contain several favorite summer resorts, especially the village of Caldwell or Lake George. Here was fought the battle of Lake George, in which the French and Algonquins under Baron Dieskau were utterly defeated by the English and Iroquois under Sir William Johnson, Sept. 8, 1755.

George, Order of St., the name of numerous orders which have been founded in honor of St. George. They include (1) a military order instituted in Russia in 1769 by the Empress Catharine II. as a reward of military achievements. (2) An order instituted in Bavaria by the Emperor Charles VII. (Charles Albert) in 1729, and reorganized by King Louis II. in 1871. (3) An order instituted by Ernest Augustus of Hanover in 1839. (4) A Sicilian military order, instituted by Joseph Napoleon, Feb. 24, 1808, and remodeled by King Ferdinand IV. in 1819. (5) The name under which the Order of the Garter was first instituted in England (see under GARTER).

George, Prince, 2d son of George I., King of the Hellenes; born in Corfu, Ionian Islands, June 24, 1869; was appointed lieutenant in the Greek navy, July 19, 1889. While traveling in Japan, in 1891, with his cousin, the Grand Duke (afterward Nicholas II.) of Russia, he rescued the latter from death at the hands of a religious fanatic. He was High Commissioner of the Powers in Crete in 1898-1906.

George, St., the especial patron of chivalry, and tutelary saint of England. Though venerated both in the Eastern and Western Churches, his history is extremely obscure, the extant accounts containing very much less history than legend. The story in the "Acta Sanctorum" ("Deeds of the Saints") is that he was born of noble Christian parents in Cappadocia, became a distinguished soldier, and, after testifying to his faith before Diocletian, was tortured and put to death at Nicomedia, April 23, 303.

George, St., one of the Bermudas. See BERMUDAS, THE.

George's Channel, St., the arm of the sea which separates Ireland from Wales S. of the Irish Sea. From Holyhead and Dublin on the N. to St. David's Head and Carnsore Point it extends about 100 miles, with a breadth varying from 50 to 70 miles. Its depth in the middle varies from 40 to 70 fathoms. The bottom is chiefly sand and gravel.

Georges, Marguérite, Joséphine (zhorzh), a French actress; born in Bayeux, France, about 1786. She was educated for the stage in Paris, made her first appearance at the Théâtre Français as Clytemnestra in 1802, and in 1808 went to Russia. In 1812 she played at Dresden and Erfurt before Alexander I. and Napoleon, and was induced by the latter to return to France. She played in England, Germany, and the French provinces, at the Odéon and Porte St. Martin theaters, Paris, 1821-1847, retired in 1855, and found it necessary to teach in the Conservatory for a living. She died in Paris in January, 1867.

Georgetown, a former city in the District of Columbia, on the Potomac river; since 1871 part of Washington (*q. v.*).

Georgetown, a town of Texas, county-seat of Williamson co.; located 27 miles N. of Austin, on the Austin branch of the Missouri, Kansas, and Texas railroad, and the terminus of a branch of the International and Great Northern. It has cotton gins and cotton-seed oil mills, and is the seat of Southwestern University (M. E. Church, South), founded in 1873. There are mineral wells in Page park, which analysis shows to be similar to the famous Carlsbad springs. Georgetown was settled in 1854 and incorporated 20 years later. Pop. (1900) 2,790.

Georgetown (formerly the Dutch Stabroek), capital of British Guiana; on the Demerara river, not far from its mouth. It is handsomely built. The principal public edifices are the government building, the cathedral, the Queen's College, and a museum and library. There are botanical gardens, several hospitals, an icehouse, and two markets. There is a short railway to Mahaica, and a telephone exchange has been established in connection with the government telegraph system. There is a good harbor, with a lighthouse, and defenses erected within recent years; the foreign trade is virtually that of the colony. Pop. (1891) 53,176. See GUIANA, BRITISH.

Georgetown University, institution in Washington, D. C., founded in 1789 by the Roman Catholic Church; has grounds and buildings valued at over $1,400,000; volumes in the library, 102,000; ordinary in-

come, about $175,000; average faculty, 150; students, 850; graduates, over 5,000.

George Washington University, a co-educational, non-sectarian institution in Washington, D. C., founded in 1821 as Columbian College; name changed in 1873 to Columbian University and in 1904 to the present; has grounds, buildings, and other property valued at over $1,500,000; average number of faculty, 185; average students, 1,500; graduates, about 6,000.

Georgia, a State in the South Atlantic division of the North American Union; bounded by North and South Carolina, Tennessee, Alabama, Florida, and the Atlantic Ocean; area, 59,475 square miles; one of the original 13 States; number of counties, 137. Pop. (1890) 1,837,353; (1900) 2,216,331; (1910) 2,609,121.

Topography.— The surface of the State is irregular, rising in terraces. The coast for about 20 miles inland is low and swampy; from here it rises about 100 feet in 20 miles till, in Baldwin county, about 200 miles from the sea, an elevation of 600 feet is reached. The foot hills and mountains begin here and extend toward the W. and N. W., reaching an altitude of 2,500 to 4,000 feet. In the extreme S. E. is the Okefinokee Swamp. A line of islands averaging about 10 miles in width extends along the coast and affords many safe but shallow sounds. The only harbors of large size are Savannah, St. Mary's, Darien, and Brunswick. The State is well watered. The principal rivers are the Savannah forming the boundary between Georgia and South Carolina, the Ogeechee, the Cannouchee, the Altamaha, the Satilla, and the St. Mary's, running to the Atlantic; and the Withlacoochee and Allapaha uniting in Florida to form the Suwanee, the Ochlockonee, and the Flint and Chattahoochee forming the Apalachicola, at the Florida line, flowing directly into the Gulf.

Geology.— The rocks of the N. part of the State are mostly of metamorphic or crystalline formation and include granites, gneisses, sandstones, and schists. A belt of Silurian origin extends through the N. W. counties with frequent outcrops of Devonian structure. There are extensive coal measures in the extreme N. W. In the central and most of Southern Georgia the metamorphic rocks are overlaid with Tertiary deposits, and further S. and E. these are themselves overlaid with Quaternary sands and clay. A Tertiary strip borders the ocean, and a Cretaceous deposit occurs in the vicinity of Jefferson county.

Mineralogy.— The State is rich in mineral resources, especially in the mountain regions N. of the Chattahoochee, and ranks second in the United States in the production of manganese; silver, emery, bituminous coal, antimony, granite, graphite, marble, magnetic and specular iron ore, zinc, limonite, tellurium, galena, mica, roofing slate, pyrites and potter's clay abound. Gold is found in seams of quartz, in veins, and in the disintegrated sands and gravel. It was discovered in 1828 in White county, and led to the forcible removal of the Cherokee Indians. In 1899 the principal mineral productions of the State were iron, 236,743 long tons, valued at $235,343, an increase over the previous year of 76,667 long tons; coal, 233,111 short tons, valued at $233,344; bauxite, 15,736 long tons, valued at $125,598; coke, 50,907 short tons, valued at $116,917; silver, 400 fine ounces, valued at $517; gold, 5,436 fine ounces, valued at $113,000; manganese, 3,089 long tons, valued at $23,377; soapstone, 1,062 short tons, valued at $42,085; and hydraulic cement, 13,000 barrels, valued at $9,750. Petroleum is also found, as are amethysts, beryl, diamonds, and other precious stones.

Agriculture.— In the N. part of the State the principal crops are wheat, corn, sorghum, oats, rye, potatoes, apples, peaches, and other temperate fruits, grains, and vegetables, while Middle and Southern Georgia are devoted chiefly to upland cotton and sugar-cane. The State ranks second among the United States in the cotton production, the output for the crop year 1899–1900 amounting to 1,284,211 bales of upland cotton and 60,888 bales of sea-island cotton, having a total value of $48,024,822. Oranges, lemons, pineapples, bananas, pecans, English walnuts, and olives are grown to perfection in the S., and the watermelons of Georgia are considered the best in the world. The principal crops of Georgia in the calendar year 1900 were corn, 34,119,530 bushels, valued at $19,448,132; wheat, 5,011,133 bushels, valued at $4,760,576; oats, 7,010,040 bushels, valued at $3,434,920; hay, 190,237 tons, valued at $2,425,522; potatoes, 391,816 bushels, valued at $301,698; and rye, 109,529 bushels, valued at $112,815.

Manufactures.— In 1900 there were reported by the United States census 7,504 manufacturing establishments, employing $89,789,656 in capital and 83,842 persons; paying $20,290,071 in wages, and $58,232,202 for raw materials; and having an annual output valued at $106,654,527. The manufacturing is principally carried on in Atlanta, Augusta, Savannah, Macon, and Columbus. The chief articles of manufacture are cotton goods, lumber mill products, flour and grist, cotton-seed oil, foundry and machine shop products, fertilizers, naval stores, railroad cars, brick and tile, wagons, and carriages, clothing, furniture, hosiery, and leather goods.

Commerce.— During the calendar year 1900 the imports of merchandise entered at Brunswick, Savannah, and Atlanta aggregated in value $577,541; and the exports, $57,326,194; making the total foreign trade of the State for the year $57,903,735. The principal articles imported were fertilizers, coal, hay, salt, and coffee; and the chief exports were cotton, naval stores, rice, timber, pig iron, hides, wool, fruits, vegetables, yarns, turpentine, and resin.

Banking.— In 1900 there were 30 National banks in operation, having $4,356,000 in capital, $2,727,097 in outstanding circulation and $480,847 in reserve. There were also 171 State banks, with $9,634,659 capital and $1,523,429 surplus; 22 private banks, with $605,123 capital and $169,707 surplus; and 11 trust and loan associations, with $1,194,650 capital and $152,692 surplus. In the year ending Sept. 30, 1900, the exchanges at the United States clearing-houses at Savannah, Atlanta, and Augusta aggregated $260,675,655, an increase over the previous year of $108,481,186.

Education.— In 1899 the school population was 756,900; the enrollment in public schools, 469,107; and the average daily attendance, 265,480. There were 6,622 public school buildings, 9,577 teachers; public school property valued at $3,977,070; receipts of the year, $1,951,107; and expenditures, $1,937,954. For higher education there were 52 public high schools, 71 private secondary schools, the State Normal School at Athens, and the Georgia Normal and Industrial College at Milledgeville. The colleges and universities were the University of Georgia at Athens; the Atlanta Baptist College, Atlanta University, Morris Brown College, and Clark University at Atlanta; the Bowdon College at Bowdon; the North Georgia Agricultural College at Dahlonega; Mercer University, at Macon; Emory College at Oxford; Nannie Lou Worthen College at Wrightsville; and the Young Harris College at Young Harris.

Churches.— The strongest denominations in the State are the Baptist, Methodist Episcopal, Presbyterian, Roman Catholic, and Protestant Episcopal. In 1899 there were 4,617 Evangelical Sunday-schools, with 35,778 officers and teachers, and 253,410 scholars.

Railroads.— The total length of railroads within the State, Jan. 1, 1901, was 5,791.5 miles, of which 104 miles were constructed during the previous year. In 1900 the assessed valuation of railroad property amounted to $46,181,721.

Postoffices and Periodicals.— In 1901 there were 2,772 postoffices of all grades, and 359 periodicals, of which 26 were daily, 7 semi-weekly, 280 weekly, 6 semi-monthly, 39 monthly, and 1 quarterly.

Georgia

Finances.— The assessed valuation of all taxable property in 1900 was $434,336,134, of which $150,606,530 was personal property, and the remainder real estate, railroad, and telegraph property. The total bonded debt in 1900 was $7,836,000, of which $7,831,500 was interest bearing and $4,500 was past due and non-interest bearing. The State owns the Western and Atlantic railroad from Atlanta to Chattanooga, Tenn., 138 miles, and leases it to the Nashville, Chattanooga, and St. Louis Railroad Company for $420,012 per annum.

State Government.— The governor is elected for a term of two years and receives a salary of $3,000 per annum. Legislative sessions are held annually beginning on Oct. 1, and are limited to 50 days each. The Legislature has 44 members in the Senate and 175 in the House, each of whom receives $4 per day and mileage. There are 11 Representatives in Congress. The State government in 1904 was Democratic.

History.— Georgia was settled by a colony of 120 persons in 1733, under a patent granted to Oglethorpe, Whitefield, and the Wesleys, June 9, 1732. It was established as a barrier between the Spanish and Indians on the S. and the Carolinas on the N., and to provide a refuge for debtors, orphans, and other needy and destitute persons. In the war between England and Spain in 1739–1743, Oglethorpe made an alliance with the Creek Indians and led the combined troops of Carolina and Georgia in an invasion of Florida, and in 1742 he drove off the Spanish fleet that had attacked the forts on the Altamaha. After the peace, the Georgians demanded slaves, which had previously been prohibited. In 1752 the trustees surrendered the colony to the crown and negro slavery was introduced. At the outbreak of the Revolutionary War Georgia, having few claims for redress and no charter on which to base them, hesitated to join the other colonies, and was not represented in the Constitutional Congress in 1774. In March, 1775, St. John's parish sent a delegate to the Continental Congress, and in July all the parishes sent representatives. On July 10, 1775, a schooner commissioned by Congress captured a British ship laden with powder off Savannah. In 1778 Georgia ratified the Articles of Confederation, and in the same year the British captured Savannah, and held it till the close of the war, despite attempts by the Americans and French to retake it. In 1779 Augusta and Sunbury were taken by the British.

The first State constitution was framed in February, 1777, and on Jan. 2, 1788, Georgia unanimously ratified the Constitution of the United States. The second State constitution was adopted in 1789, and a

GEORGIA

SCALE OF MILES

0 10 20 30 40 50

State Capital ✲ County Seats •

Size of type indicates relative importance of places

TENNESSEE

NORTH CAROLINA

SOUTH CAROLINA

Chattanooga Cleveland Rogers Etowah Gohans Murphy Hayesville McCays Ooltewah Almond Rhodo Wilmot Franklin Highlands Toxaway Hendersonville Brevard Zirconia Marietta Pickens Greenville Spartanburg Roebuck Lockhart Jc. Lockhart Chester Union Buffalo Carlisle Clinton Laurens Anderson Belton Fort Madison Walhalla Seneca Tallulah Falls Tallulah Lodge Turnerville Clarkesville Toccoa Dillards Rabun Gap Mountain City Pine Mountain Titus Hiwassee Blairsville Presley Mountain Stone Tiger Wiley Cooseercreek Wilscot Sweetgum Mineralbluff Margret Baxter Arco Parks Cleveland Yahoola Hollywood Tugaloo R. Tugalo R. Toccoa R. Chattooga R. Chattahoochee R. Savannah R. Keowee R. Seneca R. Saluda R. Broad R. Little River Tallulah R. Soque R. Tiger Creek Big Creek Big Stekoa Creek Little Stekoa Creek Panther Creek Warwoman Creek Persimmon Creek Rock Creek Dicks Creek Moccasin Creek Nacoochee Creek Sautee Creek Duncan Creek Chickamauga Creek Lookout Creek Taylors Creek Peavine Creek Shoal Creek Pumpkinvine Creek Big Creek Little Creek Sandy Creek Hurricane Creek Cane Creek Rocky Creek Big Creek Little Creek Sandy Creek Hurricane Creek Cane Creek Rocky Creek

CATOOSA WALKER DADE WHITFIELD FANNIN MURRAY GILMER UNION TOWNS RABUN HABERSHAM WHITE STEPHENS FRANKLIN HART ELBERT LUMPKIN DAWSON HALL BANKS MADISON JACKSON OGLETHORPE OCONEE CHEROKEE FORSYTH MILTON FULTON DEKALB GWINNETT WALTON CLARKE OGLETHORPE WILKES LINCOLN COLUMBIA MCDUFFIE RICHMOND AUGUSTA AIKEN BARNWELL BAMBERG ALLENDALE HAMPTON BEAUFORT JASPER EFFINGHAM BULLOCH EVANS CANDLER TOOMBS MONTGOMERY TELFAIR WHEELER EMANUEL JOHNSON LAURENS TREUTLEN WASHINGTON JEFFERSON BURKE JENKINS SCREVEN BARNWELL AIKEN EDGEFIELD SALUDA NEWBERRY LEXINGTON RICHLAND KERSHAW LANCASTER CHESTER UNION CHEROKEE SPARTANBURG GREENVILLE PICKENS ANDERSON OCONEE

Dalton Summerville Rome Cartersville Marietta Cedartown Carrollton Athens Decatur Atlanta Eastpoint Douglasville Griffin Newnan Lagrange Thomaston Barnesville Monroe Jackson Milledgeville Sparta Louisville Waynesboro Augusta Aiken Columbia Greenwood Abbeville Greenville Spartanburg Union Chester Lancaster Rock Hill Camden Sumter Florence Darlington Marion Dillon Bennettsville Cheraw Hartsville Georgetown Conway Myrtle Beach Charleston Orangeburg Barnwell Allendale Hampton Beaufort Walterboro Summerville Moncks Corner Manning Kingstree Lake City Florence Darlington Marion Dillon Bennettsville Cheraw Hartsville Georgetown Conway Myrtle Beach

Tennessee R. Ocoee R. Hiwassee R. Apalachia Toccoa R. Chattooga R. Chattahoochee R. Savannah R. Keowee R. Seneca R. Saluda R. Broad R. Little River Tallulah R. Soque R. Tiger Creek Big Creek Big Stekoa Creek Little Stekoa Creek Panther Creek Warwoman Creek Persimmon Creek Rock Creek Dicks Creek Moccasin Creek Nacoochee Creek Sautee Creek Duncan Creek Chickamauga Creek Lookout Creek Taylors Creek Peavine Creek Shoal Creek Pumpkinvine Creek Big Creek Little Creek Sandy Creek Hurricane Creek Cane Creek Rocky Creek Big Creek Little Creek Sandy Creek Hurricane Creek Cane Creek Rocky Creek

A B C D E F G H J

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35 34 33

ALABAMA
FLORIDA
ATLANTIC OCEAN
MUSCOGEE
TAYLOR
MARION
SCHLEY
MACON
HOUSTON
PULASKI
LAURENS
EMANUEL
BULLOCH
EFFINGHAM
CHATHAM
STEWART
WEBSTER
SUMTER
DOOLY
DODGE
MONTGOMERY
TATTNALL
TOOMBS
APPLING
JEFF DAVIS
BEN HILL
IRWIN
TURNER
WORTH
TIFT
COFFEE
WILCOX
TELFAIR
WHEELER
EVANS
CANDLER
BULLOCH
BRYAN
LIBERTY
MCINTOSH
WAYNE
GLYNN
CAMDEN
QUITMAN
RANDOLPH
TERRELL
LEE
DOUGHERTY
CALHOUN
CLAY
EARLY
BAKER
MILLER
MITCHELL
COLQUITT
THOMAS
DECATUR
GRADY
BROOKS
LOWNDES
BERRIEN
CLINCH
WARE
PIERCE
CHARLTON
Columbus
Americus
Albany
Dawson
Fort Valley
Dublin
Eastman
Hawkinsville
Vienna
Cordele
Abbeville
Fitzgerald
Ashburn
Tifton
Douglas
Waycross
Statesboro
Swainsboro
Metter
Claxton
Reidsville
Glennville
Jesup
Darien
Brunswick
Thomasville
Bainbridge
Cairo
Quitman
Valdosta
Nashville
Moultrie
Adel
Nahunta
Hazlehurst
Alma
Folkston
Fernandina
Jacksonville
Pablo Beach
Amelia I.
Cumberland I.
St. Simons I.
Jekyl I.
Wassaw I.
Ossabaw I.
St. Catherine Sd.
Sapelo I.
Doboy Sd.
Wolf I.
Altamaha Sd.
St. Andrew Sd.
Cumberland Sd.
Nassau Sd.
Tallahassee
Live Oak
Lake City
Madison
Monticello
Quincy
Bloxton
Wacissa
Crawfordville
St. Marks
Perry
Jasper
White Springs
Ellaville
Westlake
Greenville
Drifton
Sirmans
Lovett
Pinetta
Miccosukee L.
Jackson L.
Famonia L.
Okefenoke Swamp
Floyd's I.
Chattahoochee R.
Flint R.
Ocmulgee R.
Altamaha R.
Ohoopee R.
Oconee R.
Ocklockonee R.
Suwannee R.
St. Marys R.
Satilla R.
Little R.
Withlacoochee R.
Alapaha R.
Allapaha R.
Aucilla R.
Appalachicola R.
Hammond's 8 x 11 Map of Georgia
Copyright, 1908 by C. S. Hammond & Co., N.Y.
Longitude West from Greenwich
A 85 B C 84 D E 83 F G 82 H 81
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third, by which the importation of slaves was prohibited, in 1798. There was some difficulty with the Creeks and Cherokees in 1783–1790, but treaties of peace were concluded with them in 1790 and 1791. In 1802 the Creeks ceded what is now Southwestern Georgia to the United States, which in turn ceded it to the State, receiving in exchange all the State's claims W. of the Chattahoochee, or what is now Alabama and Mississippi. The first steamship that ever crossed the Atlantic Ocean left Savannah in 1819.

In November, 1860, a State convention was called to consider the subject of secession. On Jan. 21, 1861, an ordinance of secession was unanimously passed, and Georgia ratified the Constitution of the Confederate States and adopted a new State constitution. In January, 1861, Forts Pulaski and Jackson, below Savannah, were seized by State troops, and from the battle of Chickamauga, in September, 1863, to the winter of 1864–1865 the State was constantly the scene of conflict. Atlanta was captured by General Sherman, Sept. 2, 1864, and he began his famous march thence to the sea, Nov. 15, occupying Savannah Dec. 21. Columbus, West Point, and Macon were taken in April, 1865, by General Wilson and on May 10, 1865, Jefferson Davis was captured at Irwinsville. One of the most noted Confederate prisons was located at Andersonville in this State.

Georgia repealed the act of secession Oct. 30, 1865; adopted a new constitution; and ratified the Thirteenth Amendment to the Constitution of the United States. Congress, dissatisfied with the new constitution, put the State under military rule till another constitution was ratified in 1868; and the State was restored to the Union on its ratification of the Fourteenth Amendment in 1869. On the refusal to ratify the Fifteenth Amendment the State was again placed under military rule, but reinstated on its compliance with this demand. The recent prosperity and development of Georgia's resources has been due in large measure to the Cotton Exposition, in 1881, the Piedmont Exposition, in 1887, and the Cotton States and International Exposition, in 1895, all at Atlanta. A. D. CANDLER.

Georgia (by the Russians called Grusia, by the natives Karthli), formerly a kingdom, but now included in the Russian government of Tiflis, though the name is sometimes loosely employed to designate a much larger portion of the territory possessed by Russia S. of the Caucasus. Area, in the latter sense, about 34,000 square miles; of Georgia proper, about 15,000 square miles. The natives are a fine-looking race, the Georgian women, like the Circassians, being celebrated for their beauty. The Georgian language, together with that of the Mingrelians, Lazes, and other Caucasian peoples, seems, according to the latest researches, to form a perfectly distinct linguistic family. It possesses a not unimportant literature, commencing with the introduction of Christianity into the country. The history of the Georgians first becomes truthworthy about the time of Alexander the Great, to whom they became subject. About 324 B. C. they gained their independence under Pharnavas. They became Christianized toward the end of the 4th century. After yielding for a time to the supremacy of the Arabian caliphs Georgia regained its independence toward the end of the 10th century, which it retained till 1799, when Heraclius, successor of George XI., formally ceded his dominions to the Russian emperor Paul.

Georgia Bark, a small tree of the Southern United States closely resembling the cinchona or Peruvian bark, and belonging to the natural order *Cinchonaceæ*. It has pretty large white flowers, with longitudinal stripes of rose-color, disposed in beautiful clusters at the extremities of the branches; each flower is accompanied with a floral leaf, bordered with rose-color near the upper margin; the corolla is tubular; the stamens five, with a single style; and the capsule contains two cells and numerous seeds. The wood is soft and unfit for use in the arts. The inner bark is extremely bitter, and is employed with success in intermittent fevers.

Georgia, Gulf of, a large gulf of the North Pacific Ocean, between the continent of North America and Vancouver's Island; about 120 miles in length from N. to S.; the breadth varies greatly in its different parts, from 6 miles to 20. It communicates with the ocean on the N. by Queen Charlotte's Sound and on the S. by the Strait of Juan de Fuca.

Georgia, South, an island in the South Atlantic, lat. at its N. point, 53° 57′ S.; lon. 38° 13′ W. It is 90 miles long, and has high and rocky coasts, inaccessible from ice during a great part of the year. It abounds with seals and sea-fowl.

Georgia, University of, a coeducational non-sectarian institution in Athens, Ga.; chartered in 1785; opened in 1800; has endowment, $500,000; grounds and buildings valued at over $700,000; volumes in the libraries, 40,000; scientific apparatus, etc., $45,000; average faculty, 180; average students in all departments, 3,000; ordinary income, over $275,000; graduates, over 3,500.

Georgian Bay, formerly LAKE MANITOULIN, the N. E. part of Lake Huron, partly separated from the main body of the lake by the peninsula of Cabot's Head and

the island of Great Manitoulin. It is about 120 miles long and 50 broad.

Georgium Sidus, the name given by Sir William Herschel to a planet discovered by him March 13, 1781. Laplace, disliking the innovation of elevating one's sovereign to the sky, substituted for the name of King George that of the planet's discoverer, Herschel. The latter appellation is still widely accepted, but as the other planets were all called by the names of classic gods, Bode suggested the appellation of URANUS (*q. v.*). See also HERSCHEL.

Georhychidæ (-rī′kī-dē), mole-rats; a family of *Rodentia,* with a large head, small eyes and ears, a short or deficient tail, and five toes on each foot. They occur in Asia, Africa, and Southeastern Europe, burrowing like moles.

Geosaurus, the remains of a reptile which, if entire, would probably have been 9 or 10 feet long. They were found by Sœmmering in white lias, at Monheim in Franconia, and are now in the British Museum. Sœmmering called the animal *Lacerta gigantea.* Cuvier believed it intermediate between the crocodiles and monitors, but most nearly allied to the latter. It does not figure in Professor Huxley's enumeration of crocodilian genera.

Geostatic Arch, in architecture, a linear arch of a figure suited to sustain a pressure similar to that of the earth, which consists, in a given vertical plane, of a pair of conjugate pressures, one vertical and proportional to the depth below a given plane, horizontal or sloping; and the other parallel to the horizontal or sloping plane, and bearing to the vertical pressure a certain constant ratio depending on the nature of the material.

Geothermometer, an instrument for measuring the earth's heat at different depths, as in mines and wells. The temperature rises about 1°F. for every 70 or 80 feet of descent.

Gepidæ (jep′i-dē), a people of Germanic origin, first read of as settled about the mouth of the Vistula in the 3d century. Before the 5th century they had migrated to the Lower Danube, where they were subjugated by the Huns; but, revolting against Attila's son, they recovered their freedom and established themselves in Dacia. There their power grew so great that they levied tribute from the Byzantine emperors down to Justinian's days. In the end of the 5th century a powerful enemy arose to them in the Ostrogoths; and after them came the Longobards, who, in alliance with the Avars, inflicted a crushing defeat on the Gepidæ in 566. A part of the last named then submitted to the Avars, while a part accompanied the Longobards to Italy. Henceforward nothing more was heard of them.

Gera (gā′rä), a town of Germany, capital of the small principality of Reuss-Schleiz, on the White Elster, 42 miles E. by S. of Weimar. Nearly destroyed by fire in 1780, it is for the most part a modern town, with broad and regular streets, but its older buildings include a castle and a fine town hall. There are over a score of extensive woolen factories, besides cotton works, dyeing and printing works, manufactures of machinery, leather, tobacco, and beer for export, and four publishing houses; and eight establishments, employing 1,500 hands, turn out thousands of melodeons, accordions, and jews'-harps yearly. Pop. (1905) 46,910.

Gerace (jā-rä′che), a town of Southern Italy, 4 miles from the sea, and 37 N. E. of Reggio. It has a cathedral, rebuilt after the earthquake of 1783, and a trade in wine, especially the esteemed Lacrima di Gerace. There are iron mines and a hot sulphur spring close by, and on a neighboring plain are the ruins of the ancient Locri. Pop. 5,265.

Gerah, the smallest piece of Hebrew money, being the 20th part of a shekel. This would be about three cents. Gesenius thinks that the gerah was not a coin, but was reckoned by means of the beans of the Carob tree.

In Hebrew weights, a weight corresponding to the coin.

Geraniaceæ (-ā′se-ē), the typical order of the alliance geraniales. It consists of herbaceous plants or shrubs with tumid stems, separable at the joints. Leaves either opposite or alternate; if the latter, then they are opposite the peduncles. Stipules membranous; flowers white, red, yellow, or purple; sepals five, persistent, ribbed, unequal, one of them sometimes saccate, spurred at the base; petals five, or by abortion four; unguiculate stamens, generally monadelphous, twice or thrice as many as the petals; ovary with five carpels, ultimately forming five one-seeded cells; styles five, cohering round the torus, from which they are separable. Sixteen genera and about 750 species are known. They are found in temperate or hot climates, rarely in the arctic regions. They are often astringent and aromatic, abounding in vegetable oil. Lindley in his "Vegetable Kingdom," made *Oxalidaceæ* and *Balsaminaceæ* distinct orders from *Geraniaceæ.*

Geraniene (-rā′ni-ēn), a terpene, $C_{10}H_{16}$, obtained by the action of phosphorus pentoxide P_2O_5 on geraniol. It is a liquid, boiling at 164°, and smells like fresh mulberries. It oxidizes rapidly in the air. It unites with HC, forming a liquid compound.

Geraniol, in chemistry, $C_{10}H_{18}O$. Obtained by fractional distillation of geranium oil. A colorless, strongly refracting liquid, boiling at 233°. It is insoluble in water, soluble in alcohol and ether; when fused with potash it yields isovalerianic acid; by the action of nitric acid, it is converted into nitrobenzene, oxalic acid, and other substances.

Geranium, in ordinary language, a term most frequently applied to any of the cultivated pelargoniums (these belong to the *Geraniaceæ*, but are not the typical genus); also a book name, and partly a popular one, for the genus *Geranium*. In botany, the typical genus of the order *Geraniaceæ* and the alliance geraniales. The flowers are regular, on one or two-flowered axillary peduncles; the stamens are 10, free or connate at the base, and hypogynous. *Geranium sanguineum* is a perennial plant with one-flowered peduncles. It is found in dry rocky places, on sandy shores, and on mountains. *G. sylvaticum*, *G. pratense*, and *G. pyrenaicum* are perennial, with two-flowered peduncles. Other common species are *G. molle*, *G. rotundifolium*, *G. pusillum*, *G. columbinum*, *G. dissectum*, *G. robertianum*, and *G. lucidum*. The root of geranium contains more tannin than quino does, and is a very powerful astringent. Bigelow considers it specially valuable in the treatment of diseases continued through debility, after their existing cause has been removed. The tubers of *G. parviflorum* are eaten in Van Diemen's Land, where it is called the native carrot. Indian geranium is the name given by perfumers to *Andropogon nardus;* and the nettle geranium is *Coleus fruticosus*.

Gerar, an ancient town or place of the Philistines in the times of Abraham and Isaac, in the S. of Judah, not far from Gaza.

Gérard, Baron François Pascal, a French portrait and historical painter; born of French parentage in Rome, March 11, 1770. At 10 he was brought to France, and at 16 became the pupil of David. In 1795 he exhibited "Belisarius," which first brought him into notice; shortly afterward he painted "Psyche receiving the First Kiss from Cupid." His portrait of Madame Bonaparte in 1799 was the beginning of his career as the "painter of kings." Almost all the royal and other celebrities who visited Paris between 1799 and 1837 were painted by Gérard, who owed his success not alone to his skill as a portraitist, but also to the charm of his manners and conversation. His most celebrated portraits are those of Napoleon in his coronation robes, the Queen of Naples and her children, Talleyrand, Talma, Louis-Philippe and Madame Récamier. The grandest of his works are, however, historical pictures, the "Battle of Austerlitz" (1810) and the "Entry of Henry IV. into Paris" (1814). Gérard was appointed first court painter and raised to the rank of baron by Louis XVIII. He died in Paris, Jan. 11, 1837.

Gérard, Comte Etienne Maurice (zhā-rär′), a French marshal; born in Damvillers, Meuse, France, April 4, 1773. Volunteering in the army in 1791, he served on the Rhine, in Italy, in the Vendée campaign, in Germany, and in Spain, where he especially distinguished himself at Fuentes de Oñoro. For his brilliant services at Austerlitz (1805) he was appointed general of brigade; he also took a notable part at Jena (1806), Erfurt (1806), and Wagram (1809). During the Russian campaign of 1812 he rendered conspicuous service at the capture of Smolensk in the battle of Valontina-Gora, and at the passage of the Beresina. After Napoleon's return from Elba he commanded a division at Ligny, and was wounded at Wavre. The second restoration compelled him to leave France, and he did not return till 1817. In 1831 he commanded the French army sent to the assistance of the Belgians against the Dutch, whom he drove out of Flanders, and Dec. 27, 1832, compelled the citadel of Antwerp to capitulate. After the July revolution of 1830 he was appointed marshal and war minister by Louis-Philippe; he was again war minister from July to October in 1834. He died in Paris, April 17, 1852.

Gerard de Nerval (zhā-rär′ de ner-väl), pseudonym of GÉRARD LABRUNIE, a French poet, dramatist, and novelist; born in Paris, France, May 21, 1808. His "National Elegies," written at college and published at 19, reached two editions. He made a brilliant translation of "Faust"; and had a comedy, "Tartuffe at Molière's" brought out at 22. "The Queen of Sheba," a play written in collaboration with the elder Dumas; "A Voyage to Greece," a book of travel; "Lorelei," a novel; "Misanthropy and Remorse," an imaginative tale; "The Alchemist," a play; and "Dream and Reality," a romance, are among his most important later works. "Aloysius," "Fritz," and "Lord Pilgrim" were among the pseudonyms he used. He was one of the most imaginative and graceful writers of his country, but the splendid career and fortune within his reach were ruined by improvidence and recklessness. He committed suicide in Paris, Jan. 25, 1855.

Gerard, Dorothea, a Scotch novelist; born in Rochsoles, Lanarkshire, Scotland, Aug. 9, 1855. Her youth was passed on the Continent, and she married an Austrian, Major Julius Longard, de Longgarde. She wrote in collaboration with her sister, "Reata" (1880) and "Beggar My Neigh-

bor"; and subsequently, alone "Lady Baby" (1889); "Recha" (1890); "Miss Providence" (1897); "A Forgotten Sin" (1898); "The Impediment" (1898); "One Year" (1900); etc.

Gerard, Jean I. I. See GRANDVILLE.

Gerard, John (jer'ärd or je-rärd'), an English botanist and surgeon; born in Nantwich, Cheshire, England, in 1545. Settling in London, he kept Lord Burghley's gardens for over 20 years, practised as a barber-surgeon, becoming master of the company in 1608. His famous "Herball" was published in 1597. An enlarged edition was issued by Thomas Johnson in 1633. He died in London, in February, 1612.

Gerard Thom, or **Tenque,** founder of the order of St. John of Jerusalem; born in Amalfi, Italy, about 1040. He first visited Jerusalem for commercial objects, but about 1100 he assumed the religious habit, and associated with others who took the vows of chastity, poverty, and obedience; the object of their institution being to defend Christian pilgrims in their journey to and from the Holy Land. Thus arose the powerful order of Knights Hospitallers of St. John, who afterward became the knights of Malta and acquired such distinguished fame. He died about 1120.

Gerasa (jer'a-sä), in the time of the Romans a flourishing city of Palestine, situated among the mountains of Gilead, about 20 miles E. of the Jordan. Parts of the city wall are still in good preservation; two theaters and several temples can be identified, and 230 columns are still standing.

Gerbert de Montreuil (zher-bār' de môn-trey), a French poet of the 13th century. His most noted work is a continuation of a romance of the Grail, or tale of knighthood, written by Chrestien de Troyes and entitled "The Cavalier." Another production, of about 1225, is the "Romance of the Violet," known also as "Gérard de Nevers"; it is the model taken by Weber for his "Euryanthe," and by Shakespeare for "Cymbeline."

Gerbi (jer'bē), or **Jerba** (jer'bä), an island in the Gulf of Cabes, off the coast of Tunis. It is about 20 miles long and 14 broad. The surface is level and fertile, and occupied by a population of 30,000, mostly Berbers.

Gerbillus (-bil'lus), a genus of small burrowing rodents (the gerbils) of the family *Muridæ* (mice). They have a long tail, which is tufted at the end. There are several species, found in the sandy parts of Africa and Asia. The Egyptian gerbil (*G. ægyptiacus*), inhabiting Egypt around the pyramids, is the type. It is about the size of a mouse and of a clear yellow color.

Gerda (jer'dä), in Scandinavian mythology, wife of Freyr, and daughter of the giant Gymer; she is so beautiful that the brightness of her naked arms illuminates both air and sea. In astronomy, an asteroid, the 122d found; discovered by Peters, July 31, 1872.

Gerfalcon, or **Jerfalcon** (-fâ-kon), in zoölogy, the *Falco Gyrfalco*, a species of falcon considered as the boldest and most beautiful of the tribe. In size it approaches closely to that of the osprey. Its general color is brownish-gray, of varied tints above and white beneath, and brown longitudinal spots. The tail is crossed with a number of deeper and lighter bands, and the bill and legs are usually of a pale-blue or yellowish color. Three varieties of the gerfalcon are mentioned by Buffon; the first two are similar to the species above described, and the third is entirely white. The gerfalcon is a native of Russia, Norway, Iceland, and Baffin's Bay. Of all the rapacious birds, except the eagle, it is considered the most formidable, the most active, and the most intrepid; it attacks the largest birds boldly and when transferred from the coldest climate to the warmest its strength is not diminished, nor is its vivacity checked in any degree.

Gerhardt, Dagobert von. See AMYNTOR, GERHARD VON.

Gerhard, Eduard (ger'härt), a German archæologist; born in 1795. In 1829 he took part in founding the Archæological Institute at Rome, Italy. Returning to Germany in 1837, he became archæologist at the Royal Museum at Berlin, and afterward professor at the university. Among his numerous works are "Antique Sculptures"; "Pictures of Choice Greek Vases"; "Pictures of Etruscan and Campanian Vases"; "Greek Mythology"; etc. He died in 1867.

Gerhardt, Karl (ger'härt), an American sculptor; born in Boston, Mass., Jan. 7, 1853; studied in Paris. His works include busts of Gen. U. S. Grant, Henry Ward Beecher, Samuel L. Clemens, etc.; and statues of Nathan Hale, Gen. Israel Putnam in the Connecticut State capitol; etc.

Gerhardt, Karl Friedrich, a French chemist; born in Strasburg, Aug. 21, 1816. At 15 he was sent to the Polytechnic School of Carlsruhe, and afterward studied chemistry at Leipsic, and under Liebig at Giessen. In 1838 he arrived in Paris, where he lectured on chemistry, and where with his friend Cahours he commenced his researches on the essential oils. In 1844 he was appointed Professor of Chemistry at Montpellier. About this time he published his "Summary of Organic Chemistry." In 1848 he resigned the chair and returned to Paris to follow out uninterruptedly special inves-

tigations. In 1855 he became Professor of Chemistry at Strasburg. All his ideas and discoveries are embodied in his "Treatise on Organic Chemistry" (1853-1856). He died in Strasburg, Aug. 19, 1856.

Gerhardt, Paul, a German hymn-writer; born in Gräfenhainichen, Saxony, March 12, 1607. He became dean at the Church of St. Nicholas in Berlin in 1657, but, in consequence of his opposition to the Elector Frederick-William's attempt to bring about a union of the Lutheran and Reformed Churches, was banished from Brandenburg in 1666. The last 7 years of his life he was pastor of Lübben, Prussia, where he died, June 6, 1676. He wrote 123 hymns, all excellent, and many of them worthy to be placed among the choicest productions of Protestant sacred poetry. The one beginning "Commit thou all thy ways" is well known in England from Wesley's translation.

Géricault, Jean Louis Théodore André (zhā-rē-kō′), a French painter; born in Rouen, France, in 1791; went to Paris in 1806 and studied under Charles Vernet and Guérin. His first pictures (the "Chasseur Officer" and the "Wounded Cuirassier") were exhibited in 1812 and 1814. In 1817 he visited Italy, returned to Paris in 1819, and painted the "Raft of the Medusa" (a well-known shipwreck of the time), a work of much power, which won immediate popularity. He died in Paris in 1824.

Gerizim (ger′i-zim) and **Ebal,** the two highest mountains in the central Palestine chain (3,000 feet), separated from each other by a deep narrow valley, in which stands the town of Nâblus. The valley between them is very fertile. Jacob's well stands where the vale joins the plain of Moreh. On the slope of Ebal to the N. of the well is Sychar (now 'Askar). Mount Gerizim, along with Mount Ebal, was the scene of a grand and impressive ceremony, in which the whole people of Israel took part after crossing the Jordan, in obedience to a command which Moses had given them (Deut. xxvii.). The half of the tribes standing on Gerizim responded to and affirmed the blessings, those on Ebal the curses as pronounced by the Levites. The Samaritans built a temple on Mount Gerizim as a rival to that of Jerusalem, and organized a rival priesthood; and the Samaritan Pentateuch closed the Decalogue with the injunction, "Thou shalt build a temple on Mount Gerizim, and there only shalt thou worship." And, though the Samaritan temple was destroyed by Hyrcanus about 200 years after, the mountain on which it stood continued to be held sacred by the Samaritans. It was to Mount Gerizim that the "woman of Samaria," referred when she said to our Saviour: "Our fathers worshiped in this mountain, and ye say that in Jerusalem is the place where men ought to worship." Subsequently, a Christion church in honor of the Virgin was built on it.

Gerle, Wolfgang Adolf (gār′le), a German story-writer and dramatist; born in Prague, Bohemia, July 9, 1781. He was a prolific author of works of light fiction, employing at times different pseudonyms, such as "G. Erle," "Konrad Spät," "Hilarius Kurzweil," etc. "Corals," "Schelmufsky's Strange Adventure," and "Moonlight Pictures and Shadows," are popular. His plays, some written in collaboration with other authors, have been staged with success. He died in Prague, June 29, 1846.

Germ, that from which anything springs; the origin, source, or first principle of anything. In physiology and botany, the earliest stage in the existence of an organized being, the embryo or bud from which such a being develops; used either of plants or of animals.

Germ Cell, in botanical physiology, an oösphere, a female cell, a cell which cannot give rise to a new plant unless the power to do so be imparted to it by another cell standing to it in a relation of contrast.

Germain-en-Laye, St. (san-zher-man-on-lā′), a town in the department of Seine-et-Oise, France, on a hill adjoining the Seine, 6 miles N. of Versailles, and 9 W. by N. of Paris. Manufactures, horse-hair goods and leather. It is chiefly noted for its noble palace, originally built by Charles V. in 1370; reconstructed by Francis I.; and embellished by many succeeding sovereigns, especially Louis XIV., who added to it five extensive pavilions, and constructed the fine terrace which extends from it, with a breadth of nearly 90 feet, for a distance of 1½ miles, between the forest of St. Germain and the Seine. That monarch afterward became disgusted with, and abandoned the palace, because, it is said, he could see St. Denis, the burial-place of the French kings, from its windows. Charles IX. and Henry II., as well as Louis XIV., were born in this palace. It was the residence of Mlle. de la Vallière; and James II., of England, with most of his family, passed their exile, and died in it. It is now used as barracks and a military prison. Pop. (1901), commune, 17,297.

The Forest of St. Germain, one of the finest of its kind in France, extends N. of the town, enclosed W., N., and E. by the Seine. It is 9 miles in length by 3 in breadth; covers an extent of 8,865 acres, and is traversed by roads, the aggregate length of which is not less than 1,180 miles.

German, pertaining or relating to Germany; or a native or inhabitant of Ger-

many. Also the language of the higher and S. parts of Germany; the literary language of the whole country. Old High German was spoken from the 8th to the 12th century; Middle High German from the 12th to the 15th century; Modern High German is the existing form.

German, Low. See Low German.

German Catholics, a religious sect which sprang up in Germany about the close of 1844, which rapidly increased during the four or five following years and then as rapidly declined. The immediate cause of the formation of this sect was the exhibition by Arnoldi, Bishop of Trèves, of the holy coat preserved in the cathedral of that city and said to be the coat of Christ. The bishop accompanied the exhibition of the holy coat by a promise of plenary indulgence to any who should make a pilgrimage to Trèves to worship it. The announcement of this proceeding on the part of the Bishop of Trèves produced a feeling of general astonishment in Germany and drew from a Silesian priest called J. Ronge, who had already been suspended from his charge on account of his independent views, a letter protesting against the exhibition of the holy coat and denouncing the projected pilgrimage as idolatry. This letter was published in the "Sächsische Vaterlandsblätter" on Oct. 16, 1844, and produced an amount of excitement that was quite unanticipated by the writer. Ronge was excommunicated, but this only increased the general enthusiasm in his favor and when he entered into relations with Czerski, another independent priest who had seceded from the Church, and made along with him an appeal to the lower grades of the clergy to unite in founding a National German Church independent of the Pope and governed by councils and synods, the appeal received a ready answer from a considerable number of those to whom it was addressed. A number of congregations belonging to the new body were formed in the more important towns, especially in Leipsic, under the celebrated Robert Blum, and in Magdeburg under the teacher Kote. In the spring of 1845 there were already about 100. At this time (March, 1845) a council was summoned to meet in Leipsic to deliberate on the affairs of the body. Only 20 congregations were represented there, but these nevertheless at once proceeded under the presidency of Professor Wigard to arrange a system of doctrine and practice which was to form the basis of union for the whole Church. The Bible was recognized as the sole standard of faith, and its interpretation was left to reason, "penetrated and animated" by the Christian idea. Only two sacraments were admitted, baptism and the Lord's supper. In matters of ritual each congregation was left free to carry into practice its own views. The organization of the new Church was almost the same as that of the Presbyterian dissenting churches of Scotland. Each congregation was to choose its own pastor and elders. Affairs of a general interest were intrusted to the management of a general council to meet every five years, but the decisions of this council were to be ratified by a majority of the congregations before they became valid. The confession of sins, the hierarchy of the clergy, and the celibacy of the priests were abolished and the authority of the Pope was not recognized. On the subject of purgatory nothing was declared either for or against it. The constitution of the new Church was thus a Protestant one, but in some respects the German Catholics went even further than the majority of Protestants in a liberal direction, inasmuch as they claimed for all, complete religious liberty and declared their religion to be capable of development and modification with the progress of the human mind.

The Church established on this basis had at first, as has already been stated, great success. The most eminent men of the liberal party and the deepest thinkers of the time regarded the movement with sympathy, or at least with interest. Gervinus expressed his belief that great benefits might result from it. Many Protestants, dissatisfied with the subjection of their religion to State supervision, joined the body, which at the end of 1845 counted 298 congregations. But it was not long before the spirit of opposition began to show itself. The majority of the governments in Germany at the instigation both of the Protestant and the Roman Catholic clergy began to use repressive measures against the new body. Prussia contented itself with regulating the exercise of their worship; but some of the other States went farther. At Baden the adherents of the sect were deprived of their political rights. Austria took the course of banishing them from her dominions. But persecution from without did less hurt than the divisions within the body. Almost immediately after the meeting of the council at Leipsic a congregation had been formed at Berlin which refused to abide by its decisions. Czerski and Ronge, the two originators of the sect, became the leaders of two opposing parties within it, one of which, that headed by Czerski, clung to the traditions and doctrines of the Roman Catholic Church, rejecting only the supremacy of the Pope and the union between Church and State; while the other sought for more freedom, converted religion into a sort of popular philosophy and began to mix up with it questions of politics, exhibiting strong democratic tendencies. These were most plainly manifested during the revolutionary epoch of 1848. The schism between the two parties was then complete. One section of

the congregations of German Catholics professed to have only religious ends in view while another section openly pronounced itself in favor of socialistic principles.

From the year 1850, however, there were several attempts to reëtablish the unity of the body. An effort was made to reintroduce harmony by widening the basis of union. Instead of founding a religion, a council held at Gotha in June, 1859, proposed the formation of a religious association or confederation into which all free Protestant and even Jewish congregations were to be admitted. Legislation in the different States had become more tolerant and the carrying out of the scheme of the council of Gotha seemed to be at least practicable. But the result proved otherwise. The association consisted of too heterogeneous elements. While some of the members receding further and further from orthodoxy proclaimed simple deism as their religion and abolished baptism and the Lord's supper, others on the contrary lost themselves in an exaggerated mysticism. According to the most recent statistics there are still about 100 congregations of German Catholics in Germany; but their numbers only amounted to about 6,200 in 1895.

Germander (*Teucrium*), a large and widely distributed genus of labiate herbs, of which all the European species are of old medicinal repute on account of their aromatic bitter and stomachic properties. The species are numerous. The wall germander or true germander (*T. chamædrys*), often found on ruined walls, has probably been introduced from the S. of Europe. With the German *T. Botrys*, it enjoyed a high reputation in the treatment of gout. Wood germander or wood sage (*T. Scorodonia*) is a very common British plant, in dry bushy or rocky places. It is very bitter and slightly aromatic. It is used in the Island of Jersey as a substitute for hops. Water germander (*T. Scordium*), in wet meadows, has a smell like garlic. Cat or sea thyme (*T. Marum*), of Southern Europe, like catmint and valerian root, is much liked by cats.

German East Africa. See EAST AFRICA, GERMAN.

German Evangelical Protestant Church, in the United States, a religious body, liberal in doctrinal belief, having no confession of faith. Its ministers are associated in district unions. Number of ministers last reported, 59; churches, 66; members, 34,704.

German Evangelical Synod of North America, a religious body, accepting the symbolical books of the Lutheran and Reformed Churches, representing in the United States the State Church of Prussia, which is a union of the Lutheran and Reformed bodies. It celebrated, Oct. 12, 1890, the semi-centennial anniversary of its organization in the United States. In 1909 it reported 1,002 ministers, 1,290 churches and 249,137 members.

Germania, an extensive country of ancient Europe, situated E. of Gaul, from which it was separated by the Rhine. Its inhabitants were warlike and uncivilized, and always proved a watchful enemy against the Romans. Cæsar first entered their country; but he rather checked their aggressions than conquered them; and his successors, or their generals, also attempted to chastise their insolence. Tacitus has delineated their manners and customs with the greatest nicety, and has accompanied his description with the reflections of a philosopher.

Germanicus Cæsar, a Roman general, the son of Nero Claudius Drusus, and of Antonia, daughter of Mark Antony and niece of Augustus; born in 15 B. C. By desire of Augustus he was adopted in the year 4 A. D. by Tiberius, whom he accompanied in the war against the Pannonians, Dalmatians, and Germans. In the year 12 he was consul, and next year was appointed to the command of the eight legions on the Rhine. In 14 he was at Lugdunum Batavorum when news came of the death of the Emperor Augustus and of the mutiny for more pay and shorter service among the soldiers in Germany and Illyricum. Germanicus hastened to the camp and quelled the tumult by his personal popularity; and at once led his soldiers against the enemy. Crossing the Rhine below Wesel, he attacked and routed the Marsi, and next year marched to meet the redoubtable ARMINIUS (*q. v.*),

GERMANICUS.

the conqueror of Varus and his legionaries, whose bones had lain whitening for six years in the Teutoburg Forest. With solemn rites his soldiers buried these sad relics of disaster, then advanced against the foe, who, retiring into a difficult country, managed to save himself, and was not subdued till the year after, when Germanicus again carried a part of his army up the Ems in ships, crossed to the Weser, and completely overthrew Arminius in two desperate battles. Tiberius, jealous of the glory and popularity of Germanicus, recalled him from Germany in the year 17, and sent him to settle affairs in the East, at the same time appointing as viceroy of Syria, in order secretly to counteract him, the haughty and envious Cn. Calpurnius Piso. Germanicus died, probably of poison, in Epidaphnæ, near Antioch, Oct. 9, 19. His wife, Agrippina, and two of her sons were put to death by order of Tiberius; the third son, Caligula, was spared. Of the three daughters who survived their father, Agrippina was as noted for vice as her mother for virtue.

German Silver, a white alloy for tableware, consisting of nickel, copper and zinc in various proportions. The best quality consists of four parts copper, two parts nickel, and two parts zinc, but this quality is the most difficult to work. For some purposes the proportion of copper is slightly increased, and for articles which are to be cast instead of stamped or hammered about 2 per cent. of lead is added. To make a good malleable alloy, the three metals of which it is composed should all be of the best quality. German silver has a tendency to crack in ANNEALING (*q. v.*), and is all the more liable to do this if its component metals are impure. Its crystalline structure is got rid of by hammering, rolling, and annealing. It is harder and tougher than brass, and takes a fine polish. In color it is sufficiently near silver to make it valuable for plating with that metal. This, together with its hardness in resisting wear, has caused a great demand for German silver for certain wares made in Birmingham and Sheffield.

Spoons and forks of this alloy are made in immense numbers. Such articles as saivers, dish-covers, jugs, teapots and the like are also largely made of it, but these objects, or at least some of them, are still more largely made of BRITANNIA METAL (*q. v.*), a greatly inferior alloy, because much softer. German silver has a coppery odor, and is readily attacked by acid liquids, such as vinegar, which coat it with verdigris. Spoons and forks made of this alloy should therefore either be plated with silver or carefully kept clean.

Of late years, through care in preparing a suitable alloy, large objects, such as the bodies of jugs and coffeepots, can be formed of sheet German silver by "spinning" it on the lathe, instead of by stamping or by the slow process of hammering. Formerly it was only a soft alloy like Britannia metal that could be so treated. For some time past there has been a tendency to substitute for electroplate — *i. e.*, German silver plated with real silver — white alloys having nickel for their basis. These, however, are but varieties of German silver known under different names, such as silveroid, argentoid, navoline, and nickeline. Some of them contain small quantities of tin, cadmium, and other metals. Mountings for ship-cabins, bar-fittings, and also forks and spoons have been manufactured on a considerable scale from these new alloys.

German Southwest Africa, a German protectorate in West Africa; coast extending from Cape Frio to Walfisch bay, inland to lon. 20° E.; area, estimated, 322,450 square miles; pop., estimated, 200,000. The coast is quite infertile; inland are richer tracts. Amboland is the name of the N. district; Damaraland of the middle; and Namaqualand of the S. Damaraland is occupied by the Southwest African Company, an Anglo-German syndicate, which was formed in London in 1892, and obtained from Berlin a concession to search for and work the minerals of the district, including the copper mines of Otavi, but outside of the district worked and occupied by the German Southwestern Africa Colonial Company, which district consists chiefly of the coast lands. The German government, owing to complaints that too great favor had been shown to the Anglo-German Company, decided to give preference to German settlers, and to reserve certain parts of the country for them for 10 years. The country is apparently rich in copper and in agricultural resources, though as yet it is quite undeveloped. Coffee is exported. The seat of administration is at Great Windhoek, 180 miles inland from Swakopmund, the N. part of the colony. A railway runs from Swakopmund to Windhoek, about 237 miles; another via Tsumeb to Grootfontein, about 400 miles; a third from Lüderitz Bay to Keetmanshoop about 270 miles; and a fourth is projected from Seeheim to Kalkfontein, about 135 miles. There is at present but little agriculture, but market-gardening is common and increasing. Cotton cultivation has begun in the Outjo district; viticulture and tobacco-growing are being tried; and the discovery of diamonds in 1909 caused considerable excitement. The colony communicates with European countries by means of cable.

Germantown, a former village in Philadelphia, co., Pa.; since 1854 the 22d ward of Philadelphia. Considerable historical interest is attached to the place. It was settled by the Germans, under a grant from

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William Penn, in 1684, and on Oct. 4, 1777, a battle took place between the armies under Washington and the English under Howe. After several hours of severe struggle the Americans were defeated, the loss being about equal on both sides. Germantown has many handsome residences, a National bank, historical society, St. Vincent's Seminary, Stevens School, Friend's School, and all modern city improvements.

Germany (Latin, Germania; German, Deutschland; French, Allemagne; Spanish, Allemania), the name given to a large part of Central Europe, and in one sense including all the countries in which the mass of the people are German in race and language. Parts of Switzerland, Austria, and Russia may thus be said to be German. The name, however, in its usual and more restricted application, is confined to those States which constitute the German empire. Taken in this sense Germany is bounded on the N. by the Baltic, Denmark, and the North Sea; W. by Holland, Belgium, and France; S. by Switzerland and Austria; E. by Russia. The following table shows the elements of which the German empire as now constituted is made up:

	Kingdoms.	Area in sq.m.	Pop. 1905	Pop. per sq. m.
1.	Prussia	134,603	37,293,324	277
2.	Saxony	5,787	4,508,601	778
3.	Bavaria	29,282	6,524,372	222
4.	Würtemberg	7,528	2,302,179	305
	Imperial Territory.			
5.	Alsace-Lorraine	5,600	1,814,564	323
	Grand Duchies.			
6.	Baden	5,821	2,010,728	345
7.	Hesse	2,965	1,209,175	407
8.	Mecklenb'g-Schwerin	5,135	625,045	123
9.	Mecklenb'g-Strelitz.	1,131	103,451	91
10.	Oldenburg	2,479	438,856	176
11.	Saxe-Weimar	1,388	388,095	277
	Duchies.			
12.	Brunswick	1,424	485,958	342
13.	Saxe-Meiningen	953	268,916	282
14.	Saxe-Coburg and Gotha	755	242,432	317
15.	Saxe-Altenburg	511	206,508	404
16.	Anhalt	906	328,029	369
	Principalities.			
17.	Waldeck	433	59,127	136
18.	Lippe	469	145,577	310
19.	Schaumburg-Lippe.	131	44,992	343
20.	Schwarzburg-Rudolstadt	363	96,835	266
21.	Schwarzburg - Sondershausen	333	85,152	255
22.	Reuss (elder line).	122	70,603	578
23.	Reuss (younger line)	319	144,584	453
	Free Towns.			
24.	Bremen	99	263,440	2,661
25.	Hamburg	158	874,878	5,467
26.	Lübeck	115	105,857	920
		208,830	60,641,278	290

The small island of Heligoland, now forming part of Prussia, was added to the empire in 1890. As each State is described under its own name, the description here is confined to leading features which belong to Germany as a whole.

Physical Features.— These are greatly diversified and present such an irregular succession of mountains and valleys, tablelands and plains as makes it extremely difficult to arrange them for the purpose of a distinct general description. The whole country may, however, be considered as consisting of a mountain region in the S., with a great N. plain between it and the sea. This mountain region does not in average height exceed 5,000 feet and is extremely complicated, consisting of a great number of separate ranges, which ramify in all directions and become so interlaced with each other that the limits assigned to them are in many instances arbitrary. The only range which has any title to be considered as a common center is the Fichtelgebirge, continued E. by the Erzgebirge and the Riesengebirge, S. E. by the Böhmerwald, W. by the Thüringerwald, Rhöngebirge, and Spessart, and carried to its N. limit in the Harz. The W. boundary of this region is formed chiefly by the Schwarzwald and Odenwald. Across the Rhine are the Vosges mountains on the French frontier. The great plain in the N. extends without interruption to the German Ocean and the Baltic and flattens down so much when it approaches them as in many places to require artificial protection from their waves. Its length W. to E. may be about 550 miles, and its average breadth 200 miles. To all appearance it has once been covered by the sea, alluvial deposits of great depth being spread over almost every part of its surface, and generally with so large a proportion of sand as to make it for the most part naturally unfertile.

Rivers.— Germany is remarkably well watered. Its central mountain region and plateau forms part of the great watershed of Europe and either gives rise to more than one of its most important rivers or sends them their principal affluents. Thus the Danube, rising near its extremity, flows across it in an E. direction, and does not quit it till it about reaches the extreme E. of Bavaria. The Rhine, in like manner, though it neither rises nor terminates within Germany, flows within it for the greater part of its course and is considered by the Germans as their national river par excellence. After these come the Elbe, strictly speaking the greatest river of Germany, inasmuch as almost its whole basin lies within it; the Oder, Weser, Main, Neckar, Mosel, Ems, and Eider — all of which are navigable.

Minerals.— Germany possesses numerous and varied mineral riches, the most important of which are common coal and brown coal, iron, zinc, lead, and salt. In respect of its mineral wealth the Prussian monarchy especially takes a prominent place among the States of Europe, and in the production of zinc surpasses all other countries in the world. After Prusssia the kingdom of Saxony is the most important mining country in Germany. Gold and silver

are obtained in the Harz mountains and in the kingdom of Saxony; gold to a limited extent also in Bavaria. Iron is chiefly obtained in Prussia, Alsace-Lorraine, Bavaria, Brunswick, and Saxony. Copper, lead, and zinc are found chiefly in Prussia. Tin is found only in the kingdom of Saxony; quicksilver, antimony, and sulphur are mainly confined to Prussia; nickel and alum are obtained chiefly in the same State; arsenic chiefly in Saxony, graphite in Bavaria, and blue and green vitriol in Prussia and Saxony. The most extensive coal beds lie in the kingdoms of Prussia and Saxony. Brown coal is obtained also in the duchy of Anhalt. Rock salt is obtained in considerable quantities in Prussia, Anhalt, and Würtemberg. Marble, alabaster, kaolin, calamine, molybdenum, cinnabar, lime, asbestos, slates, millstones, freestones, trass and sundry precious stones — as amethysts, garnets, etc.— are also found in various localities. Germany is likewise extremely rich in mineral waters, including chalybeate, sulphurous, alkaline, saline, and warm of all kinds.

Climate, Flora, and Fauna.— The climate of Germany is fairly uniform throughout, the lower latitude of the S. portions being compensated by greater elevation above the level of the sea. January is always the coldest month, its mean temperature being generally below freezing point, except on the North Sea coast, the N. W. plain, and the Upper Rhine valley. The mean temperature of the warmest month (usually June) generally ranges from 60° to 66° F. The range of mean annual temperature is from 36.3° on the Brocken to over 50° in the Upper Rhine valley and parts of Bavaria. The greatest annual rainfall is that of the Upper Harz region (67 inches); for Rhenish Prussia and Westphalia it is 41 inches, for the Upper Rhine valley from 23 to 27, and rather less for the Berlin region. The best climates are those of the Upper Rhine valley, and the valleys of the Moselle, Main, and Neckar. Germany belongs entirely to the region of the Middle European flora, and is crossed by the N. limit of vine cultivation (about 51°–52° N. Lat.). The total number of flowering plants in its flora is about 2,500. About a quarter of the surface is under forest, the largest proportional amount being in Hesse-Nassau. The chief trees are the beech and oak, mainly in the W.; pines, chiefly on the N. plain; firs, in the mountainous districts; birch and alder, chiefly in the N.; larch, on the S. mountains; and chestnut in the Upper Rhine valley. There are three faunal zones — Alpine, Upper German, and Lower German — the first being the richest. The fauna is mainly a forest one, and includes 65 mammals and 225 birds. Notable species are the wolf, badger, mink, beaver, wild cat, wild boar, elk, bear, and one kind of tortoise.

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Agriculture, etc.— Germany is becoming less and less an agricultural and more and more a manufacturing nation, but in many parts agriculture is still the main business of the population. About 65 per cent. of the total area is under cultivation, and of this more than half is under the chief cereals, fully a 16th under other corn crops and leguminous plants, nearly a sixth under potatoes, turnips, sugar beet, cabbages, etc., while rather less than a 50th represents orchards and gardens. The empire does not now grow the cereals in sufficient quantity to meet its own requirements, but is becoming increasingly dependent upon imports, especially of wheat and barley from Russia, Hungary, Rumania, and North America. Of the chief cereals, rye occupies the largest area, and next in order come oats, wheat, barley. Spelt is grown in the S. and maize also to a small extent. Buckwheat is a N. crop, and potatoes, though grown all over the empire, are most widely cultivated in the N. Flax and hemp thrive best in the central mountainous districts. Hops are raised chiefly in Bavaria (Main valley below Nuremberg), Baden (Carlsruhe district), Hagenau district W. of the Rhine, Würtemberg, and Posen; sugar beet in an extensive region from Leipsic to Brunswick, including Magdeburg and Halle, around Bautzen in the Breslau-Liegnitz district, near Danzig, Neu-Strelitz, Bromberg, Frankfort-on-the-Oder, etc.; tobacco chiefly in Baden, the Bavarian Palatinate, and Brandenburg. The chief wine-growing region is the Rhine valley from Baden to Cologne, with the valleys of the Moselle and the Neckar; but other important districts are the Main valley about Würzburg, the valley of the Saale in the Naumburg-Weissenfels district, the Elbe valley at Dresden, parts of the Rhine valley above Strassburg, and a small district N. of Görlitz. The growing of vegetables and market gardening generally is most extensively carried on around Berlin, Dresden, Leipsic, Erfurt, Hamburg, Brunswick, and Düsseldorf. Fruit-growing is most successful in the middle and S. of the empire, especially in Saxony, Franconia, and the Middle Rhine valley. Good horses are reared in the provinces of East and West Prussia, Mecklenburg, Holstein, and Hanover; cattle thrive best on the North Sea coast, in Franconia, the Vogtland, and the Alpine districts; sheep-breeding is declining, but good wool is still obtained from Saxony, Silesia, and Brandenburg. Swine are bred chiefly in Westphalia, Mecklenburg, Pomerania, Bavaria, and Prussian Saxony. The imports of sheep, pigs, butter, cheese, and eggs are increasing rapidly.

Manufactures.— The recent progress of German manufacturing industry is without parallel among European nations, and is due in large measure to the great advance

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in technical education. The textile industries give employment to about a million persons, the chief branches being as follows: Cotton in Upper Elsass (Mülhausen), Saxony (Chemnitz), Rhenish Prussia (München-Gladbach, Elberfeld-Barmen), Würtemberg (Reutlingen), Bavaria (Bayreuth, Augsburg), Baden, and Silesia (government of Liegnitz); wool spinning in Rhenish Prussia, Saxony, Würtemberg, and Elsass; woolen cloth in the above districts and also in Lower Lusatia and Southeast Brandenburg (Cottbus-Serau district); hosiery in Chemnitz,, Glauchau, Plauen, Thuringia, Würtemberg, and Elsass; carpets in Berlin, Barmen, etc.; linen weaving on frontiers of Silesia and Bohemia, Saxony (Zittau), and the Bielefeld district; jute goods in Brunswick, Meissen, etc.; silk in Crefeld, Elberfeld-Barmen, Berlin, Aix-la-Chapelle, Baden, and Lorraine. Three or four hundred thousand persons are employed in the iron and steel manufacture. Its chief seats are: Rhenish Prussia and Westphalia from Düsseldorf to Dortmund, and the Aix-la-Chapelle district; Upper Silesia; and the extreme S. part of the Rhine province between Luxemburg and the Palatinate; but the iron works of Hanover, Saxony, Thuringia, Bavaria, and Würtemburg are also important. The smaller iron industries are chiefly carried on in Solingen, Hagen, Gevelsberg, Remscheid, Aix-la-Chapelle, Iserlohn, Lüdenscheid, Altena, etc. Over 200,000 men are employed in the machinery manufacture, mainly in Rhenish Prussia, Westphalia, Saxony (kingdom and province), Brandenburg (Cottbus to Seraub), Silesia, Bavaria, Elsass, etc. Cassel is the chief place for locomotives, and Berlin, Chemnitz, Dortmund, and Düsseldorf are the chief centers for steam engines and machine tools. Shipbuilding is carried on in Bremen, Danzig, Elbing, Flensburg, Hamburg, Kiel, Lübeck, Rostock, Stettin, and Wilhelmshaven, and river steamers are built in Dresden, Mainz, Munich, and elsewhere. Other manufactures of importance are: Plate glass (Rhenish Prussia, Westphalia, Silesia); bottle glass (Saxony, Rhenish Prussia, Bavaria, Hanover, Lusatia, etc.); earthenware (Silesia, Hesse-Nassau); porcelain (Meissen, Berlin, Dresden, Silesia, Rhenish Prussia, Thuringia, etc.); bricks, chiefly in N.; tanning (especially Mainz, Worms, Kirn, Malmedy, Saxony); boots, and shoes (Pirmasens, Mainz, Balingen, Offenbach, Thuringia, Saxony, Silesia); gloves (Saxony, Würtemberg, Berlin); fur goods (Leipsic); gold and silver, brass, and bronze wares; toys (especially Nuremberg and Thuringia); optical, medical, mathematical, musical, and other apparatus and instruments; telegraphic and electrical apparatus and machinery (Aix-la-Chapelle, Berlin, Breslau, Chemnitz, etc.); calcium carbide and acetylene; drugs; aniline and alizarine dyes; soap and candles; beet sugar (Saxony, Silesia, Rhenish Prussia, Thuringia; trade centers are Magdeburg, Breslau, Berlin, Cologne); brewing (best in Bavaria, Berlin, Dresden); distilling; furniture, cigars (Saxony); lithographic stones (Solnhofen); etc. The cottage system of industry is gradually being displaced by the factories, but it is still common in some branches.

Internal Communication.— The excellent river system has been supplemented, especially in recent times, by the construction of numerous canals. The total length of railway controlled by the Union of German Railways in 1900 was 55,963 miles, of which 30,242 were in the German empire, the rest being in Austria-Hungary, Netherlands, Luxemburg, Rumania, etc. The total railway mileage of Germany in 1900 was 31,647, of which Prussia had 26,672, Bavaria 4,192, Saxony 1,878, Baden 1,210, Würtemberg 1,163, and Elsass 1,155. Of the total, 28,547 miles were State lines. Bavaria and Würtemberg have separate postal and telegraph administrations.

Commerce and Shipping.— The territory of the customs union known as the Zollverein now comprises the whole empire, with the addition of Luxemburg and the Austrian communes of Jungholz and Mittelberg, and with the exception of the free port of Hamburg, part of Cuxhaven, the free ports of Bremerhaven and Geestemünde, Heligoland, and some S. frontier communes in Baden. The total imports in 1901 were valued at $1,372,413,910, and the exports at $1,094,663,610. The imports came mainly from the United States, Great Britain, Austria-Hungary, Russia, France, and Belgium, and the exports were sent chiefly to Great Britain, Austria-Hungary, Russia, United States, Netherlands, Switzerland, and France. The chief imports were cereals, wool, timber, cotton, hides, silk, coal, cattle; and the chief exports were iron goods, drugs, coal, woolens, cottons, sugar, machinery, iron, silks, etc. The mercantile marine is steadily increasing in numbers, and now includes the fastest transatlantic steamers. On Jan. 1, 1901, it comprised 3,883 vessels (registered tonnage, 1,941,-645), of which 1,390 (registered tonnage, 1,347,875) were steamers. The principal seaports of Germany are Hamburg, Bremen, Lübeck, Stettin, Kiel, Danzig, and Königsberg.

Finance.— The total revenue and expenditure of the empire for 1902 were estimated to balance at $540,340,764. The chief sources of revenue are the customs, excise duties on tobacco, sugar, salt, and spirits in all the States, an excise duty on beer except in Bavaria, Würtemberg, Baden, and Elsass, stamps, posts, and telegraphs except in Bavaria and Würtemberg, railways, and the matricular-beiträge paid by the feder-

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ated States to the imperial treasury in proportion to population, but with additions in the case of those States which administer their own posts, telegraphs, and beer duties. The chief heads of the expenditure were the army, navy, civil administration, etc. The bonded debt of the empire in 1900 was $528,655,000, against which are to be set the invalid fund of about $98,000,000, and the war treasure fund of $30,000,000.

Constitution.— The constitution of the German empire is based on the decree of April 16, 1871. The presidency of the empire is the privilege of the King of Prussia, to whom belongs the hereditary title of German emperor. The legislative authority is vested in the Bundesrath, or Federal Council, and the Reichstag, or Imperial Diet. The prerogatives of the emperor are to represent the empire in its relation to other States, to declare war and conclude peace in the name of the empire, to contract alliances and conclude treaties with foreign States, to accredit and receive ambassadors. The assent of the Bundesrath is, however, necessary to a declaration of war, unless the imperial territory be invaded, or its coasts attacked. The emperor has also the supreme command of the army and navy, summons, opens, prorogues, and concludes the Bundesrath and Reichstag, appoints and dismisses officials of the empire, and superintends the consulate.

The Bundesrath consists of 58 representatives of the members of the empire. Of these 17 are returned by Prussia, 6 by Bavaria, 4 each by Saxony and Würtemberg, 3 each by Baden and Hesse, 2 each by Mecklenburg-Schwerin and Brunswick, and one each by Saxe-Weimar, Mecklenburg-Strelitz, Oldenburg, Saxe-Meiningen, Saxe-Altenburg, Saxe-Coburg-Gotha, Anhalt, Schwarzburg-Rudolstadt, Schwarzburg-Sondershausen, Waldeck, Reuss-Greiz, Reuss-Schleiz, Schaumburg-Lippe, Lippe-Detmold, Lübeck, Bremen, and Hamburg. Alsace-Lorraine (Elsass-Lothringen) is represented in the Bundesrath by four commissioners without votes. Every year or every session standing committees of the Bundesrath are appointed by the members from their own number: (1) for the army and fortifications, (2) for the navy, (3) for the customs and other imposts, (4) for trade, (5) for railways, posts and telegraphs, (6) for justice, (7) for finance, (8) for foreign affairs, and (9) for the affairs of Alsace-Lorraine.

The Reichstag is elected by secret voting in all the States, every German above 25 years of age having a right to vote in the State in which he resides. Members of the army and navy cannot exercise their right of voting while their period of service lasts. Anyone may be returned to the Reichstag who has the right of voting and who has belonged for at least a year to one of the States. As a rule, one member is returned to the Reichstag for every 100,000 of the inhabitants of each State, but every member of the empire sends at least one deputy, even though its population is under that number. In 1902 the Reichstag consisted of 397 members, namely: 236 from Prussia and Lauenburg, 48 from Bavaria, 23 from Saxony, 17 from Würtemberg, 15 from Alsace-Lorraine, 14 from Baden, 9 from Hesse, 6 from Mecklenburg-Schwerin, 3 each from Saxe-Weimar, Oldenburg, Brunswick, and Hamburg, 2 each from Saxe-Meiningen, Saxe-Coburg-Gotha, and Anhalt, and 1 each from the other States. Proposals of laws are laid before the Reichstag by members of the Bundesrath, or by commissaries appointed by it. Every member of the Bundesrath has the right of appearing in the Reichstag, and has a right to be heard there at any time to represent the view of the government. No one can at the same time be a member of the Bundesrath and the Reichstag. The Reichstag lasts for five years. To dissolve it within that period a decree of the Bundesrath and the assent of the emperor are necessary. In case of a dissolution new elections must take place within 60 days, and the new Reichstag must meet within 90 days. To render an imperial law (Reichsgesetz) valid there must be a majority of votes in its favor both in the Bundesrath and in the Reichstag, and nothing else is required. Changes in the constitution may be effected in the same way. Disputes between two or more States of the empire, in so far as the common law courts are incompetent to deal with them, may be settled by the Bundesrath on an appeal being made to that body by either of the parties to the dispute.

The empire has the sole right of legislating on all matters connected with the army and navy, the finances of the empire, commerce, posts and telegraphs (except in Bavaria and Würtemberg), railways, in so far as they are deemed necessary for the defense of the country, and proposed modifications of the constitution of the empire. Certain other matters are left largely to the management of the individual States.

Army and Navy.— Service in the army or navy is obligatory on every German capable of bearing arms from the age of 17 to that of 45. Within this period seven years must be passed in the standing army or in the fleet (generally the years between 20 and 28), two of them in active service (three for cavalry and horse artillery). The remainder of the seven years are passed in the reserve. The next five years are passed in the first class or "ban" of the Landwehr or Seewehr (land or sea defensive forces); service continuing in the second class or ban up to the age of 39. Of young men becoming liable to service every year, only a certain number chosen by lot join the regular army; the remainder enter the Ersatz-

truppen or dépôt reserve, in which service lasts for 12 years. The Landsturm consists of all from 17 to 45 who are not otherwise in service; being divided into two bans or sections; the first comprising men from 17 to 39, the second those from 39 to 45. This force is only called on for active service in case of an invasion of the country. Young men above 17 years of age, who are able to pass an examination on general subjects, and who volunteer for active service in the army, and agree to equip and maintain themselves during active service, are admitted into the reserve after one year's service. This privilege is also granted to teachers in primary schools, and Roman Catholic priests ordained before a certain age are exempt from active service and drill altogether.

Organization and Strength of the Army. — The German army consists of 23 army corps, of which three are furnished by Bavaria, two by Saxony, one by Würtemberg, and the remaining 17 by Prussia and the other States. The Bavarian corps are numbered separately, and in time of peace form a separate army under the King of Bavaria. The Prussian Guard Corps, with headquarters at Berlin, is recruited from all Prussia, but the others have districts alloted to them. The corps are grouped into five inspections, each comprising from three to five corps. The following is a list of the headquarters of the various corps arranged in inspection groups, the first mentioned town in each being the headquarters of the inspection: Berlin — Königsberg, Stettin, Altona, Hanover, Danzig; Dresden — Posen, Breslau, Dresden, Leipsic; Hanover — Munster, Coblentz, Cassel, Stuttgart, Frankfort-on-the-Main; Munich — Berlin, Magdeburg, Munich, Würzburg, Nuremberg; Carlsruhe — Carlsruhe, Strassburg, Metz. Each corps has ordinarily two divisions, each comprising infantry, cavalry, and field artillery. Each army corps district is divided into two divisional districts, and from four to six brigade districts. Each brigade district is subdivided into from one to six landwehr districts, and the total number of these district commands is 293. In case of war the army corps are brought up to their full complement of men by drawing on the reserve and the landwehr.

The following table shows the total strength of the German army on the peace footing in 1900:

	Officers.	Rank and File.
Infantry	13,314	335,797
Cavalry	2,406	56,819
Field Artillery	2,980	52,622
Foot Artillery	872	18,730
Pioneers	571	12,504
Train	322	6,213
Railway, Telegraph, and Balloon Service	237	5,175
Others	3,142	3,276
Total	23,844	491,136

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Under the Army Act of 1899 the peace effective is to be gradually increased so as to reach 495,500 in 1903, and that number is to be maintained till March 31, 1904. The war strength is now estimated at about 3,000,000 men.

Strength of the Navy. — The German war fleet has been greatly increased in recent years and the rate of increase is likely to be maintained for some time. By the law of June 14, 1900, the effective strength (excluding torpedo boats and some others) has been fixed as follows: A fighting fleet comprising 2 admiral's flag ships and 4 squadrons, each of 8 ships of the line, 8 large and 24 small cruisers, a fleet for service abroad of 3 large and 10 small cruisers; a reserve of 4 ships of the line, 3 large and 4 small cruisers. The present strength of the imperial navy is as follows: 14 battleships of the line, 8 armored coast defense ships, 13 armored gunboats, 11 large cruisers, 25 small cruisers, 5 gunboats, 16 school ships, and 13 others, besides torpedo boats. The personnel of the navy is recruited from the maritime and semi-maritime population of the empire. The total is at present about 30,000 men.

Money, Weights, and Measures. — By the law of Dec. 4, 1871, a uniform gold standard was introduced for the whole German empire, it being decreed that out of 1 pound of fine gold 139½ pieces of an imperial gold coin should be struck, the 10th part of which should be called a mark, and divided into 100 pfennige; that an imperial gold coin of the value of 20 marks should also be struck at the rate of 69¾ to 1 pound of fine gold; and that these coins should be made of an alloy containing 900 parts of gold and 100 parts of copper. The same law ordered the adoption of the mark as the general unit of the German coinage, commencing Jan. 1, 1875. By the supplementary law of May 6, 1873, it was enacted that two-mark and five-mark pieces should also be issued, the former in silver and the latter partly in gold and partly in silver. The 10-mark piece (*Krone*) and 20-mark piece (*Doppelkrone*) are nearly equal in value to the English half sovereign and sovereign respectively. The old silver thaler (= 3 marks) is still legal tender. A mark is equal to 23 cents in United States gold.

Since Jan. 1, 1872, the French metrical system of weights and measures has been in force throughout the German empire. It had previously been adopted by a law of the diet of the North German Confederation, and under the constitution of the new German empire it was arranged that the new system of weights and measures should be introduced into the South German States, according to the terms of separate treaties previously concluded by them with the North German Confederation. As the values of the different units of the metric

system are given in the article WEIGHTS AND MEASURES, it will be sufficient here to give the German names of the various denominations of that system:

Measures of Length—

Das Milimeter or Der Strich	= the Fr.	Milimètre.
" Centimeter or " Neuzoll	= "	Centimètre.
" Decimeter	= "	Décimètre.
" Meter or Der Stab..	= "	Mètre.
" Dekameter or Die Kette	= "	Decamètre.
" Kilometer	= "	Kilomètre.

The new German mile is equal to 7,500 meters.

Measures of Surface —

Das Quadratmeter or Der Quadratstab	= the Fr. sq.	Mètre.
" Ar	= "	Are.
" Hektar	= "	Hectare.

The unit of the measures of capacity is *das Kubikmeter* or *der Kubikstab* = the French *stère*.

In liquid measure the following terms are used:

Das Liter or Die Kanne...	= the Fr.	Litre.
" Hektoliter or Das Fass	= "	Hectolitre.

A measure equal to half a liter is called a *Schoppen*, and one equal to 50 liters a *Scheffel*.

Measures of Weight —

Das Milligramm.	the Fr.	Milligramme.
" Decigramm.	"	Centigramme.
" Centigramm.	"	Décigramme.
" Gramm.	"	Gramme
" Dekagramm.	"	Décagramme.
" Kilogramm.	"	Kilogramme.

Half a kilogramm is one *Pfund*; 50 kilogramms, or 100 *Pfund*, make one *Centner*; and 1,000 kilogramms one *Tonne*.

HISTORY.— The territory to which the ancients gave the name of Germany was much larger than the modern territory of the same name. It comprised to the N. of Denmark, Sweden, and Norway, and on the S. Pliny makes it extend as far as the Alps, but up till the time of Cæsar the S. boundary was the Danube beyond which the Celts inhabited. The boundaries generally given are on the N. the North Sea (Mare Germanicum) and the Baltic (Mare Suevicum); on the S. the Danube; on the W. the Rhine; on the E. the Vistula, Sarmatia, Dacia, and the Carpathian (Sarmation) mountains. The boundary on the E. with Sarmatia and Dacia is not exactly defined, and on the W. the Rhine was only a nominal or formal boundary. The Germans had extended beyond the Rhine in the time of Cæsar, who gives this boundary. The Belgæ and the Treviri, who occupied Alsace, were at least mixed races; and Ptolemy gives the names Germania Superior and Germania Inferior to two divisions of Belgica extending along the W. bank of the Rhine, from the sea to the Sequanian territory, near Basel. These divisions are also mentioned by Tacitus as forming two of the six divisions of Gaul. Germany E. of the Rhine was called Germania Magna or Barbara. Pliny enumerates 68 tribes and 94 towns in Germany.

Germany, especially the S. part, was covered in the time of the Romans by extensive marshes and forests which were inhabited by the elk, the urus, the bear, the wolf, the boar, the wild cat, and the deer. The population was large, however, particularly in the N. and E., the chief indication of which is the number of the armies, or rather of the armed tribes which these districts from time to time sent out, and by which at length the Roman empire was overwhelmed.

From language and other indications the Germans are supposed to have migrated from Upper Asia, passing by the Caucasus and the N. of the Caspian and Euxine seas, to Europe. This immigration must have taken place in non-historical times. There is no mention of it in the national legends and the people considered themselves autochthones, as they were also regarded by the Romans.

The ancient Germans bore the greatest resemblance to the Celts. They are described as tall, handsome, fair, with blue eyes, which are said to be fierce in expression, and light or red hair, which they rendered bright with a soap which they used as a dye. Both men and women, except slaves, whose hair was cut for distinction, wore the hair long, and red hair which became fashionable among the Roman ladies, was made an article of export. The women are said to have been almost equal in size and strength to the men. The Germans cultivated the land, but some tribes were half nomad, and the chief occupations of all were war and the chase together with the breeding of cattle. They had horses, dogs, oxen, pigs, sheep, and goats. The horses were small but strong; the dogs were suited for the chase. Pigs were numerous and ham formed an article of export. The oxen were small, but the cows yielded a good supply of milk. The houses of the fixed tribes were commonly of clay and showed no constructive art. They generally stood apart and were rarely collected into villages. A cloak of wool or skin formed the principal article of male attire; the women wore close-fitting garments of their own construction, and at a later period men of superior rank also wore close-fitting garments. A shield of wood covered with leather was generally the only article of defensive armor; sometimes the skin of a horned animal's head with the horns on was used as a helmet. Axes, spears, clubs, swords, slings, bows and arrows were among the offensive armor, the first being the most common. Weapons were made at first of stone and afterward of metal. Their food consisted of flesh roasted or merely dried and smoked, milk, butter, eggs, fish, and especially oatmeal porridge. Their chief drink was beer, made from wheat or barley. At all their feasts they drank to excess, and as this induced fighting, the women generally left before the drinking began.

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The most distinctive characteristic of the Germans was of course their warlike character. Even the women followed the armies, tended the wounded, and sometimes actively joined in the fight. The men were arranged in battle, as in their marches, by tribes; tactics were unknown and though their attacks were furious they were unable to bear the tedium of a campaign. Their love of liberty is represented as extreme; but it is also said to have been overcome by their passion for gambling. A loser would often pledge his personal liberty as his last stake and suffer himself to be sold as a slave. This would at least have the good effect of curing him of gaming; as a German slave could have no property, he would have nothing left to play for. They were passionately fond of music, especially of singing. It is to these N. nations that we owe the first rude combinations which have since been fashioned into modern harmony. The music of the S. was chiefly rhythmic and melodious, and classic ears could not have endured the shapeless masses of sound which preceded the development of the laws of harmony. They sang at weddings and funerals, and on going into battle, when they are said to have devoted their enemies with frightful imprecations to the gods of war and thunder. Marriage was generally contracted late and required the general consent of kinsmen. The bride received the dowry from the husband. Women are said to have been more highly honored among the Germans than among almost any other semi-barbarous race. This testimony comes from both ancient and modern sources. The chivalry of mediæval Europe is generally attributed to the spread of German habits together with the influence of Christianity. This concurrence of evidence cannot be without foundation, but there is probably a good deal of sentimental exaggeration in it. The warriors, at all events, are represented to have been lazy, and to have left the hard work of cultivating the fields a good deal to the women and old men. The Romans in this and other respects set up the Germans as models of virtues which were partly drawn from their own imagination. They represented them as faithful and trustworthy, but this description seems only to apply to their dealings with friends. With the narrow morality of an uncultivated people they seem to have considered fraud as well as force lawful against an enemy. The young men received their armor in public assembly from their parents or kinsmen at the age of 20, and afterward enjoyed the rights of freemen.

About the tenure of land there appears to have been different customs. It seems in some cases to have been regarded as public property and under the control of the magistrates, in others to have been held by a hereditary title. Each tribe or nation was divided into four classes: (1) The nobles, from whom the king and chiefs of the districts, or pagi, were chosen. (2) The freemen, who with the nobles had the right to choose their residence and to hold heritable property. They were obliged to serve in the armies, of which they formed the chief strength, and to attend the popular assemblies. (3) The freed men, a middle class between freemen and slaves, had no landed property, but farmed the land; they served in the armies, but were not admitted to the popular assemblies. (4) The slaves, who were entirely in the power of their masters, who could dispose of their lives, control their marriages, and rule over them with undisputed power. They were employed both in domestic service and in field labors. They are said to have been tolerably well used, and to have been better off than Roman slaves. At the head of each of the tribes which lived independently in time of peace, there was in general a separate king or chief, elected by the nobles in a free assembly of the people. Each tribe was divided into military districts and each district had its own magistrate, who was assisted in the administration of justice by a college of 100 men. The magistrates were elective and some tribes were governed by them alone. In time of war the king of the tribe was frequently superseded by a leader chosen for one or more tribes, who held the civil as well as the military power. The popular assembly, attended by all the freemen, controlled the power of the king, and had also the power of trying capital offenses. In earlier times the popular assembly could depose the king. It met regularly at new or full moon and also on all emergencies requiring its intervention. The freemen appeared in these assemblies in full armor. The meetings generally ended in hard drinking. Justice was also administered in the open air by judges assisted by a jury. Trials by lot or judicial combat were sometimes permitted. Trials were also wound up with a drinking bout. In later times the customs of the Germans formed the basis of various written codes, as the Salic, Ripuarian, Burgundian, but in the earlier period there were no written laws. Punishment in general took the form either of vengeance or compensation. The former was the right of the injured, the latter the adjudication of the tribunals. A family one of whose members was slain could pursue the murderer to death, but this vengeance was generally commuted by the tribunal for a fine. In like manner other offenses were dealt with by way of compensation. A freeman could only be beaten by order of a priest, and banishment or imprisonment was only inflicted for political offenses. Fines were in money, horses, cattle, etc. The only non-

political offense that was capital was insolvency. Cowards, traitors, and persons guilty of unnatural crimes were put to death. History as well as the law was propagated by tradition and by the songs of bards. These, when recording warlike deeds, were frequently sung before or during the battle.

The accounts of the religion of the Germans are considerably obscured by the Roman habit of giving their own names to foreign gods. They worshiped Woden or Odin; Thor, the god of Thunder; Freir, the wife of Woden; Tuisco, the ancestor of their race; Mannus, his son, and other deities, besides the sun, moon, and stars. Their worship was conducted to a great extent in the open air in mountains, forests, rocks, and caves. Their priesthood, though they had a distinct caste, seems to have possessed a patriarchal character. A father was the priest of his family. Each tribe had its peculiar secondary deities, both benevolent and malignant. The priests possessed considerable power. From their religious rites they told the will of the deity in regard to public undertakings, which means that they dictated their own will or the orders of their chief to the people. They presided in the popular assemblies. There were also priestesses who possessed the gift of prophecy. Sometimes human sacrifices were offered. The booty taken in war, and sometimes prisoners, were sacrificed to the gods. There were a few simple trades among the Germans, such as carpenters, smiths, and masons, and the women spun and wove. On the coast and the larger rivers, particularly the Rhine and Danube, there was a rudimentary commerce. Furs, hides, ham, goose-quills, red hair, and soap for dyeing were exported, and wine, coins, trinkets, and other commodities received in exchange. Roman coins were circulated, but there was no native coinage. Both ships and canoes were used in navigation.

Tacitus classifies the German nations into three groups, Ingævones, Hermiones, and Istævones. These divisions are said to be named from the three sons of Mannus. The first inhabited the shores of the ocean, the second the interior, the third the S. and E., but their limits are not defined.

The first distinct appearance of the Germans on the stage of classical history occurs 113 B. C., when the Teutones, a German people, appeared along with the Cimbri, supposed to be a Celtic one, on the frontiers of Gaul defeated the Romans in several battles, and after the Cimbri had invaded Spain, were joined by the Ambrones, a people of Sarmatia, and continued to ravage Gaul. They were defeated by Marius near Aix (Aquæ Sextiæ) 102 B. C., when 100,000 are said to have been slain and 80,000 or 90,000 made prisoners. A small number who escaped, about 6,000, are supposed to have settled in the N. of Gaul and become the ancestors of the Ædui. In 58 B. C. Ariovistus, King of the Suevi, who had crossed the Rhine and with an army of 120,000 Germans had subdued the greater part of Eastern Gaul, was defeated by Cæsar and forced to recross that river. In 55 and 54 B. C. Cæsar himself crossed the Rhine, but effected no permanent settlement. He acquired an accurate knowledge only of the tribes nearest the Rhine, the Ubii, Sicambri or Sygambri, Usipetes, and Tencteri. He enlisted Germans in his army, both against the Gauls and against Pompey. Of the Germans with whom he did not become acquainted, he was informed that they lived more by hunting and pasture than by agriculture, held their fields in common, and prevented the approach of foreign nations by devastating their borders.

The civil wars diverted the attention of the Romans from Germany. The Confederacy of the Sicambri made inroads into Gaul with impunity, and Agrippa transferred the Ubii, who were hard pressed by the Suevi, to the W. side of the Rhine. But the Sicambri having defeated Lollius, the legate of Augustus (16 B. C.), the emperor himself hastened to the Rhine, erected fortifications along the bank of this river to oppose the progress of the enemy, and gave his stepson Drusus the chief command against them. This great general was victorious in several expeditions and advanced as far as the Elbe. Tiberius after him held the chief command on the Rhine during two years and exercised more cunning than force against the Germans. He induced them to enter the Roman service. The bodyguard of Augustus was composed of Germans and the Cheruscan Arminius was raised to the dignity of knight. Tiberius having received the chief command a second time (A. D. 4), advanced to the Elbe. Germany had now been subdued by the successes of Drusus and Tiberius from the Rhine to the Weser, and Augustus had determined to introduce into it the regular administration of a Roman province. For this purpose he selected P. Quintilius Varus, who in accordance with his instructions proceeded to introduce the Roman rule; but these orders were either premature or were rashly executed. The Germans revolted under the leadership of Arminius, the Cheruscan already referred to, who had acquired a knowledge of military tactics in Rome. Besides the Cherusci, the Marsi, the Chatti, and the Bructeri joined the revolt. Arminius concocted his plans with a subtlety which speaks volumes for the vaunted fidelity of the Germans. By his recommendations the Germans obeyed all the orders of Varus, who had taken up his quarters on the banks of the Weser. Arminius and the other chiefs visited his camp on friendly terms.

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Varus was induced by their recommendations to divide his troops. In the meantime a distant tribe was induced to revolt. Varus marched against them while his pretended allies went to collect their forces. He had entered the Teutoberg Forest without suspicion of danger with three legions, when he was suddenly attacked by the combined forces of the Germans, and after three days' fighting his army was almost completely destroyed (A. D. 9). He himself put an end to his life. The fortress of Aliso, erected by Drusus, to which a few had escaped, was afterward taken and destroyed and the Romans lost all their possessions E. of the Rhine. The Cherusci now for a time became the principal nation of Germany. Germanicus after suppressing a revolt among the legions of the Rhine led them against the Germans and in a succession of campaigns avenged the defeat of Varus by ravaging the country of the Marsi and the Chatti and defeating the Cherusci under Arminius (A. D. 14–16), but he failed to recover the Roman ascendency in Western Germany. The wars which broke out among the Germans themselves, however, enabled the Romans to establish themselves in the S. W. Maroboduus, who had been sent to Rome as a hostage, and educated at the court of Augustus, at the head of some Suevian tribes, had subdued or expelled the Boii, who inhabited Bohemia and part of Moravia, established the Marcomannic kingdom, and organized the neighboring tribes into a league for defense against the Romans which became known as the Marcomannic confederacy. Augustus dispatched Tiberius against Maroboduus, but the revolt of the Cis-Danubian provinces compelled Tiberius to make peace with him. Afterward the Marcomannic confederacy excited the jealousy of the Cherusci, and a war ensued which ended (A. D. 17) in the defeat of the Marcomanni. Maroboduus besought the assistance of Rome, and Drusus was sent to mediate a peace; but in A. D. 19 on some new offense Drusus was preparing to invade the country of the Marcomanni when Catualda, a chief of the Gothones whom Maroboduus had exiled, invaded and conquered it. Catualda was himself overcome and expelled by the Hermunduri. After this the Marcomanni were for a time dependent on the Romans, though with a king of their own.

The Romans had during this period, or from about A. D. 16, commenced to establish themselves on the S. W. between the Upper Rhine and the Upper Danube. Here they formed a province called the Agri Decumates, peopled by Gauls, Germans, and Romans and subject to tribute. It was ultimately included in Rhætia and protected by a wall dividing it from the free Germans, but this proved an ineffectual protection against the incessant attacks to which it was subject during the decline of the empire. The Cherusci after the loss of their great leader Arminius, A. D. 21, fell from their high rank among the German nations. Weakened by internal dissensions they were conquered by the Chatti, who now rose into importance, and sank into an insignificant tribe to the S. of the Hercynian Forest. They appear again in the Frankish confederacy in the 4th century. The Chatti made repeated incursions across the Rhine which it required the force of more than one Roman emperor to restrain. They were also absorbed in the Frankish confederacy, as well as a colony of the Sicambri which Tiberius had transplanted to Gaul, and settled between the banks of the Lower Meuse and the Rhine. The Frisians, who had early entered the Roman alliance and remained faithful to it till A. D. 28, rose and expelled the Romans in consequence of the oppression of Olennius, the Roman governor. Corbula attempted to subdue them A. D. 47, but was recalled before he had achieved a decisive success.

The Batavi, a colony of the Chatti who left their homes in consequence of internal broils and occupied an island at the mouth of the Rhine, became allies of the Romans whom they furnished with soldiers, particularly with cavalry. They revolted A. D. 69 in the reign of Vitellius, and were with difficulty subdued. Domitian (A. D. 84) undertook an expedition against the Chatti and constructed a frontier wall between the free Germans and those subject to Rome. The Marcomanni had in the meantime been extending their dominion and had come into contact with the Romans on the Danube. Domitian asked their assistance according to treaty, in his war with the Dacians, and on their refusal went to war with them. Being defeated by the Marcomanni he was obliged to make a humiliating peace with Decebalus, King of Dacia.

As the aggressive force of the empire abated it continued to be more and more subject to the incursions of the Germans in Gaul, in Rhætia, in Noricum, and Pannonia. The Marcomanni were kept in check by Trajan and Hadrian, but being pressed by the migrations of other German tribes, they invaded the Roman provinces in 166, and commenced the Marcomannian war which was continued with a short interval till 188, when Commodus purchased peace of them. After this time their inroads increased in boldness and in the reign of Aurelian they penetrated into Italy and reached as far as Ancona. From this time they began to decline in importance, and the last mention of them is among the hordes of Attila. Two new combinations of German tribes — the Alemanni and the Franks — began soon after the termination of the Marcomannian war to threaten the Roman dominion on the W. banks of the

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Rhine, and these incursions went on increasing till by the end of the 5th century the Germans had conquered Gaul, Italy, Spain, and part of Africa, having established a new kingdom on the ruins of Carthage. This great movement is called the migration of the nations. The Saxons, Frisians, and Angles toward the close of this period began their invasions of Britain. After this migration Germany itself continued in a divided state till it was conquered by Charlemagne. From the establishment of the Frankish kingdom of Clovis till the end of the Carlovingian dynasty the most important events of German history will be found in connection with the history of France.

The deposition of Charles the Fat in 887 separated Germany from France; and Arnulf, an illegitimate descendant of Charlemagne, acceded to the crown of the former country. He was crowned emperor in 896 after a victory over Berengarius, Duke of Friuli. He died in 899, and was succeeded by his infant son Louis, who was proclaimed King of Lorraine in 900, assumed the title of emperor in 908, and as such is designated Louis IV. He died in 911, and with him the German branch of the Carlovingian dynasty became extinct. The German nations in their general assembly or diet chose Conrad, Count or Duke of Franconia, as his successor. He died in December, 918, of a wound received in battle with the Huns. In 919 Henry the Fowler, Duke of Saxony, was elected. He invaded and annexed Lorraine which was now as afterward disputed between France and Germany. He extended the empire by successful wars against surrounding and less civilized peoples — the Huns, Vandals, Danes, and Bohemians — and he defeated the Hungarians, to whose incursions Germany was at this epoch subject, at Merseburg in 934. He was succeeded by his son Otto the Great in 936, who completed the conquest of Bohemia (950), invaded Lombardy, and was proclaimed King of Italy (951); after deposing Berengarius a second time he received the Italian crown at Milan (961); and revived the empire of Charlemagne and received the crown of the Holy Roman empire from the Pope, Feb 2, 962. He died in 973 and was succeeded by his son Otto II., who had been crowned emperor by the Pope in his father's lifetime. In 976 Otto deprived Henry of Bavaria, with whom he had been engaged in war, of his duchy. He also had a successful war with Lothaire, King of France, for the possession of Lorraine. He attempted the conquest of Calabria in 981, and held a diet at Verona in 983, at which his son Otto III. was declared his successor. He died in Rome the same year. Otto III., who was in his fourth year when he succeeded his father, was crowned by the Pope in 996. He held a diet at Rome in the same year and another at Aix-la-Chapelle in 1000. In January, 1001, he defeated the Saracens in Italy. He died in 1002. Henry II., Duke of Bavaria, surnamed the Saint, the hereditary heir of the Saxon line, succeeded after a contest with Herman, Duke of Suabia, a rival claimant of the crown. He had frequent wars in Poland and Italy, and in 1022 he presided at the Council of Seligenstadt. He died in 1024, and was canonized by Pope Eugenius II. in 1152. With him ends the Saxon line of emperors.

Conrad II., surnamed the Salic, a Franconian nobleman and a descendant in the female line of Otto the Great, was chosen to succeed him. In 1033 he succeeded to the kingdom of Arles, which provoked a war of succession with Eudes, Count of Champagne. He also spent several years in Italian wars. He died in 1039. He was succeeded by his son Henry III., who as on former occasions had been chosen in his lifetime. He exercised more despotic authority in Germany than any of his predecessors, setting aside the fundamental laws of the empire established by the diets. He deposed and elected Popes. His policy, which was indeed that of his predecessors more boldly pursued, if it could have been carried out would have established in Germany a hereditary monarchy. He died in 1056, and was succeeded by his son Henry IV., born in 1050. His long reign was filled with disasters owing to the turbulence of his kingdom and his differences with the Pope, in which his diets frequently sided against him. In 1073 began his famous quarrel with the Pope about investitures. This great contest, which was pursued with deadly animosity by successive pontiffs, occupied the whole of his reign and the greater part of that of his son. In the same year the Saxons revolted and involved him in a civil war. He was repeatedly excommunicated by Popes, and deposed them in his turn. In 1077 Rudolph of Suabia was elected as rival emperor by the party obedient to the Church, or politically opposed to the emperor. Rudolph defeated him several times, but was mortally wounded in battle in 1080. Hermann of Luxemburg, chosen to succeed Rudolph, made peace with Henry in 1088. Conrad, the emperor's eldest son, next revolted, and was crowned in 1093. Henry put him under the ban of the empire and had his second son Henry elected his successor at the diet of Aix-la-Chapelle in 1098; but Henry was also induced to revolt by the inveterate enemies provoked by the reforms of the emperor, who was deposed in 1105, and died in the following year unabsolved by the Church.

Henry V., who had dethroned his father at the instigation of the Pope, inherited notwithstanding the quarrel with the

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Church about investitures. He was also engaged in wars with Hungary, Bohemia, and Flanders, in which he was frequently unsuccessful. He was excommunicated by seven councils and his subjects were incited to revolt by the papal legate. At length in 1122 he settled the question of investitures with Pope Calixtus II. He died in 1125. On his death there was a contested election and a civil war between Lothaire, Duke of Saxony, and Conrad of Hohenstauffen, in which the former was successful. A contest was now begun between the Saxon and Hohenstauffen (Suabian) families, in which the celebrated party names Guelph and Ghibelline originated. On the death of Lothaire in 1138 Conrad III. (of Hohenstauffen) was chosen to succeed him. The most powerful of his vassals was Henry the Proud, Duke of Saxony and Bavaria. At the diet of 1138 Henry was summoned to resign one of his duchies on the plea that it was contrary to the fundamental laws of the empire for the same person to hold two. On his refusing he was deprived of both and put under the ban of the empire. In May, 1147, Conrad set out on the second crusade, from which he returned in 1149. He died in 1152, and was succeeded by his nephew, Frederick Barbarossa. Frederick reconciled himself with Henry the Lion, son of Henry the Proud. Conrad had already restored to him the duchy of Saxony, and Frederick gave him back Bavaria.

Frederick is celebrated for his wars, particularly for the numerous invasions of Italy, in which the greater part of his life was passed. He held numerous diets to procure means for his campaigns and regulate the affairs of the empire. At the Diet of Würzburg in 1180 he put Henry the Lion, who had proved ungrateful to himself and of whose tyranny there were many complaints, under the ban of the empire and deprived him of all his estates. In 1189 he set out for Palestine, and was drowned near Seleucia June 10, 1190. His son Henry VI. began his reign with a war in Southern Italy. He imprisoned Richard I. of England, 1192–1194. Like his father he was excommunicated by the Pope. He conquered Sicily and was crowned king of it in 1194. He died in Messina in 1197. Philip, brother of Henry, and Otto IV. were elected by rival factions in 1198. Philip, who was successful, was assassinated in 1208. Otto IV., the son of Henry the Lion, was recognized by the Diet of Frankfort in 1208 as the successor of Philip. After superintending the execution of severe edicts against the brigands of Germany he passed into Italy in 1209 and occupied himself with the conquest of the kingdom of the Two Sicilies, of which Frederick, son of the Emperor Henry VI., had been acknowledged king till 1212, when the Pope having stirred up a party against him, he returned to that country, but was unable to make head against Frederick, who had been elected to replace him, and retired to his hereditary dominions, of which his rival could not deprive him. He died in 1218.

Frederick II., King of the Sicilies, was elected emperor in 1212. One of the most remarkable characters in the 13th century, his life was passed in contentions with the Popes about the Crusades and matters connected with Italian politics. The Lombard league was renewed against him. He was repeatedly excommunicated, and though he went on a crusade failed in all his efforts to reconcile himself with the Church. He passed a severe law against heretics and to put an end to the Guelph and Ghibelline factions in Germany, he erected the duchy of Brunswick for the descendants of Otto (1235). The independence of the German princes was legally established in his reign. Two rival emperors were put up against him by the Church party — Henry, Landgrave of Thuringia, in 1246, and William, Count of Holland, in 1247. He died in 1250. Conrad IV., his son, was excommunicated like his father, and had to contend against William of Holland. He died in 1254. He was the last emperor of the house of Hohenstauffen, which became extinct on the death of his son. His successor, William of Holland, was slain in Friesland in 1256. Richard, Earl of Cornwall, and Alfonso X., King of Castile, were chosen emperors in 1257; but the internal divisions of Germany had already deprived the office of all authority, and neither of them had any power. Till 1273 the German empire had no real head.

Rudolph of Hapsburg, the founder of the Austrian house, was chosen emperor in that year, and applied himself vigorously to repress the disorders to which this state of anarchy had given rise. He destroyed the castles of more than 70 robber nobles and executed many of the criminals. He also contrived to enrich his own family by his victories over the King of Bohemia and the recovery of the duchy of Austria, with which he invested his son Albert. He died in 1291. Adolphus of Nassau, his successor, was deposed in 1298 by the Diet of Mentz, which alleged a heavy list of crimes against him. Albert I., son of Rodolph, was chosen emperor the same year. He is chiefly celebrated for his wars with the Swiss as Duke of Austria, which led to the independence of Switzerland. He died May 1, 1308, and was succeeded by Henry VII., of Luxemburg, nearly the whole of whose reign was passed in Italy, where he died in 1313. He obtained the kingdom of Bohemia for his son. In 1314 a double election took place, Frederick, Duke of Austria, sometimes called Frederick III., was elected along with Louis of Bavaria, and after a civil war was acknowledg-

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ed as joint emperor in 1325. He died in 1330. Louis V., who now became sole emperor, was engaged in constant quarrels with the Popes. He died excommunicated and deposed in 1347. Charles IV., King of Bohemia, and grandson of the Emperor Henry VII., was elected on the deposition of Louis in 1346. He was chiefly occupied with the care of his hereditary dominions and was little respected in Germany. His reign is chiefly distinguished for the Golden Bull (1356) regulating the electorate, which is treated of elsewhere. Several rivals were opposed to him at the beginning of his reign. He died in 1378. Wenceslaus, his son, was deposed for his excesses first by the electors of the empire in 1400. Rupert, Count Palatine, elected 1400, possessed little authority. Sigismund, King of Hungary and Bohemia, son of Charles IV., was elected by a party in 1410, and unanimously in 1411. His reign is distinguished by the commencement of the Reformation in Bohemia, by the Council of Constance, the condemnation of Huss and Jerome, and the burning of the former in violation of the emperor's safe conduct. He died in 1437. Albert II. (V. of Austria), son-in-law of Sigismund, was elected in 1438, and died in the following year. He was succeeded by his second cousin Frederick, Duke of Styria and Carinthia, usually called Frederick III. His character was feeble and his authority small. The empire was disturbed with commotions which he hardly tried to suppress. He was engaged in war with his brother Albert for his hereditary estates, and with George Podiebrad and Matthias, Kings of Bohemia and Hungary, on which kingdoms he had claims. He was also involved in the disputes between France and Burgundy. Yet he has earned the epithet of Pacific. He originated the famous motto of the house of Austria — *a. e. i. o. u.* (*Austriæ est imperare orbi universo* — It is Austria's part to rule the whole world), and though unsuccessful in all his plans, he did something to justify it in marrying his son Maximilian to the heiress of Charles of Burgundy. In his reign Constantinople was taken by the Turks. He died in 1493, and was succeeded by his son Maximilian I.

The reign of Maximilian may be considered an epoch in the history of Germany. To give a connected view of the emperors up to this time we have omitted many matters of historical importance not limited to particular reigns which we shall here briefly review.

Limits and Relations with other States. — The boundaries of the German empire cannot be given with any distinctness, both because they were continually changing, and because, particularly from the revival of the fiction of the Holy Roman empire by Otto I., they were never well defined. The semi-religious character of the empire, and its relations with the head of the Church, gave it a claim of superiority over other Christian States, and even independent nations were not always free of a suspicion of the validity of this claim, while the German diets were apt to claim authority where they had no power. At the time of the disruption of the empire of Charlemagne there were besides many conflicting feudal claims, and these were, as long as the feudal tenure remained in force, continually increased by the vicissitudes of war and alliances. This element of uncertainty common to all States operated most powerfully in Germany from the number of independent principalities composing the empire, which was liable to be increased or diminished by the successes or reverses of its members as well as of its head, who often possessed little real power and whose claims were thus often dependent on the weakness or strength of the vassal over whom they were asserted. We shall therefore deal here only very generally with the limits of the empire, referring for further information to BELGIUM, BOHEMIA, DENMARK, FRANCE, HUNGARY, ITALY, SWITZERLAND, etc., where the temporary or permanent claims asserted over these countries will be more fully detailed.

On its separation from France Germany was much more restricted on its N., E., and S. frontiers than in modern times. These were occupied by nations less civilized, to whose incursions the German States were liable, as the Roman provinces had formerly been to theirs. Henry the Fowler and the Ottos added the marches of Austria and Misnia to the empire, and their successors made further conquests. Mecklenberg and Pomerania were subdued in the reign of Frederick I. by Henry the Lion and Albert of Brandenberg, surnamed the Bear, and afterward became duchies. The house of Austria added Styria, Carinthia, Carniola, and the Tyrol; it had lost Switzerland, and had at the time we have reached acquired through Maximilian fresh claims on Burgundy and the Netherlands. The empire early had extensive claims in France. Arnulf acquired the kingdom of Lorraine, which had belonged to the ancient kingdom of Austrasia, and which formed a constant subject of contention between France and Germany. The kingdom of Arles, containing the county of Provence and Transjurane or Upper Burgundy, already a fief of the empire, was acquired as a hereditary possession by the Emperor Conrad I., and in the time of Conrad II., Franche Comté, Dauphiné, the Lyonnais, Provence, Savoy, and part of Switzerland, were included in the empire. The consolidation of the French monarchy by the acquisition of the Burgundian possessions was the work of Louis XI. Denmark and Poland owed allegiance for Jutland and Silesia up

to the middle of the 14th century. Bohemia early became permanently connected with the empire, and its king was one of the high officers of the empire, and held the electorate. Hungary also became early associated with the empire, and like Bohemia ultimately became the inheritance of the house of Austria. Nearly the whole of Italy had at times become subject to the emperors, and their superiority was recognized by most of the Italian cities. This, as we have seen, brought them into violent contentions with the Popes, and the papal and imperial factions in the Italian cities acquired during the Hohenstauffen dynasty the names of Guelph and Ghibelline. The Lombard league formed against Frederick I. and Frederick II. indicates the power of the former faction.

Internal Divisions and Government of the Empire.— At the extinction of the Carlovingian dynasty Germany was divided into five nations or dukedoms — Franconia, Suabia, Bavaria, Saxony, and Lorraine, the last occupying the left bank of the Rhine. Besides the territory subject to these dukedoms, there were extensive domains in all parts of the empire, and on both sides of the Rhine, including the territories afterward subject to the ecclesiastical electors, and the Palatinate, directly subject to the crown. This imperial domain was deemed so ample to support the dignity of the crown that it was the constitutional usage for each emperor on his election to grant away his hereditary estates to some member of his family. But as in France the gradual alienation of the imperial domain was one of the chief causes of the decline of the Carlovingian dynasty, so in Germany the same cause wrought an important change in the constitution and in the position and power of the heads of the empire. It is hardly necessary to seek the particular causes of the alienation of the domain in Germany. When the whole territory is not equally subject to the head of the State there must always in the exigencies of government arise sufficient motives for alienating the portions directly dependent. These can only be replaced by confiscations, the retention of which by the head of the State will be sure to cause jealousies, which a weak government does not provoke. In the circumstances of the empire in its earlier ages there were ample opportunities for alienation. In the reign of Frederick II. in particular, and during the interregnum which followed the fall of the Hohenstauffen dynasty, the whole territory of Germany became practically independent of the head of the empire, so that even the vassals of a house which like that of Hohenstauffen had become extinct in becoming immediate vassals of the crown, held their possessions, however unimportant, by a tenure as independent as that of the most powerful

princes. This change in the position of the head of the State made the constitutional usage which required the resignation by an emperor elect of his hereditary estates, cease to be practicable or expedient. The most powerful princes of Germany or the countries connected with it were usually chosen to the imperial dignity. They retained their hereditary possessions, in which, when not engaged in war for the extension of their dominion, they usually resided. Thus the affairs of Germany became subordinate to the aggrandizement of a particular house, and the other princes became more confirmed in the policy of restricting a power which not only interfered with their independence but was directly employed in promoting the schemes of their rivals. This change took place on the election of Louis V., who retained his hereditary dukedom of Bavaria.

Each of the original dukedoms of Germany contained a feudal nobility nearly as independent of their head as he was of the emperor. The nobles next in rank to the dukes, who were called princes, were constituent members of the diet. The counts of the empire and even the untitled nobility, a large class, possessed privileges incompatible with the centralization of the government. Each dukedom or principality when it became independent had its own states, which had the power of making laws within its own jurisdiction. The dukedoms and counties, having been originally administrative offices of government, were not at first divisible; but as the division of heritable property among children prevailed in Germany, they first became hereditary and then fell in with the national custom. Even the electoral territories were thus divided till their further alienation from the electoral dignity was forbidden by the Golden Bull. Two of the original duchies, Franconia and Suabia, became extinct by the 13th century. Others were created in the course of conquest; but by the beginning of this century, if not previously, the custom of the division of hereditary fiefs began to prevail. Sometimes the division was absolute. Ultimately it became common, to prevent the fiefs escheating to the empire, that each branch should have the right of reversion to the estates of the other. The duchy of Saxony was so subdivided that the electorate was attached to the small territory pertaining to the town of Wittenberg. The natural consequence of this subdivision was to increase the number of independent principalities. On the extinction of the two great ducal houses many towns and great numbers even of the lesser nobility became immediate vassals of the empire. This disruption and dissolution of authority was a source of endless confusion. The different States formed their own alliances and made war and peace at their own instance. Their right to do so was admitted

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in the time of Frederick I., and in the reign of Frederick II. the princes, practically independent, acquired a formal charter of independence. But this was not all. Even nobles who possessed a castle made predatory war on their own account, while the emperor, absent perhaps during the greater part of his reign in Italy, or engaged in civil war on his own account, had neither means nor interest to check their lawlessness. Thus an abuse of feudalism which often appeared on a small scale elsewhere, expanded without bounds and endured for many centuries even up to the time of the Reformation in Germany. These robber nobles abounded, especially in Franconia. The diets were constantly occupied with expedients for alleviating the disorders resulting from this state of anarchy, and often proclaimed peace which they had not the means of enforcing.

Another peculiar result of the want of central authority was the position of the great dignities of the Church. Everywhere in Europe the Church acquired great possessions; but the holders of these possessions in Germany, not only the ecclesiastical electors, but bishops and abbots, became like the head of the Church himself, temporal princes and were often much more occupied with temporal politics than with the affairs of religion.

Cities.— One of the most interesting chapters of German history is the rise of the cities, which, amid all the confusion in the political relations of the country, made steady progress, and if they did not rival the cities of Italy in commercial importance excelled them in the steadfastness of their adherence to the cause of freedom and constitutional government. From an early period — the exact time is not known — the cities of Germany were represented in the diet. In the 10th century they were divided into mediate and immediate, or such as were included in the territories of dukes or counts and such as were directly dependent on the empire. The former were generally represented along with the feudal vassals in the Provincial States, the latter were generally governed by a bishop as imperial vicar. In early times they generally supported the authority of the emperor, as their interest was common with his in diminishing the power of the greater vassals. Henry V., or a diet in his reign, enfranchised the inferior townsmen or artisans, who had previously been distinguished from the upper class of citizens or burgesses and burdened with oppressive usages. The cities were somewhat late acquiring municipal privileges. Municipalities were at first established about the reign of Frederick I. as assistants to the imperial or episcopal bailiff. They soon began to assert their independence and often expelled the bailiff by force. The predatory habits of the nobles, besides the claims of superiority over entire cities or particular citizens asserted by the princes, involved the cities in continual warfare with the feudal nobility, and often also with their ecclesiastical superiors. Between the city walls and the palisades bounding their territory the cities granted a refuge to all vassals who fled to them from the oppression of their superiors. They were called phahlbürgers. This refuge was repeatedly forbidden by the diets, particularly by the Golden Bull, as an encroachment on the rights of the nobility. But the diets could not enforce their prohibition and it was not the interest of the cities to obey it. The cities had also ausbürgers, or persons who, without residence, were granted the privilege of citizenship and protected against the payment of feudal dues.

The necessity of defending their privileges and the desire sometimes of asserting rights which did not belong to them, compelled the cities to enter into leagues among themselves, which soon became extensive and formidable. Among the earliest of these combinations was the Hanseatic league, formed to resist both the oppression of rulers and the depredations of land and sea robbers. A league was formed in 1255 by more than 60 cities of the Rhine, headed by the three ecclesiastical electors, to resist the depredations of the lesser nobles. The Suabian league formed in 1376 was of similar origin. These leagues were met by counter-associations of nobles and princes.

Diets.— The German diets have been traced to those great assemblies of the different States of their kingdoms held by Charlemagne and his successors, called Champs-de-Mars and Champs-de-Mai. These again go back through the Merovingian dynasty to the ancient free assemblies of the Franks and other German tribes. In the diet of Charlemagne at Aix-la-Chapelle the bishops with their priests and deacons, the abbots with their monks, and the emperor with the dukes and counts, formed three distinct bodies. The clerical bodies attended to the affairs of the Church; in the political assembly, presided over by Charlemagne, codes compiled from the customs and laws of the different nations, Salian, Ripuarian, Saxon, Bavarian, Alemannian, etc., were promulgated, while the project of a general law for the empire was announced. The luxury and dissipation of the clergy both regular and secular was already a standing subject of complaint.

The exact constitution of the early German diets or their mode of transacting business is not known. In the 12th century the counts of the empire became distinguished from the princes and lost the right of voting in the diets. The election of an emperor was at first undertaken by the whole diet, but whether the members voted

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individually, by nations, or according to any other method, is not determined. The right of prætaxation, that is the right possessed by a few of nominating the person proposed for the choice of the whole electors, is first noticed in the election of Lothaire, which was intrusted to 10 persons chosen by the diet. Neither the time nor the place of meeting of the diets was at first fixed. They were called by the emperor at his own pleasure, but as they had the power of granting supplies their meetings were frequent, and from the time of the Hohenstauffen dynasty, regular. They concerned themselves generally with all the affairs of the empire, but as their authority over the different States was partial, and their policy could only be carried out by the executive force of the emperor, they must be regarded rather as a check on or an auxiliary of the imperial policy than as an independent power in the State. The affairs of the Church and the quarrels of the emperors with the Church constantly occupied the diets, which sometimes took one side, sometimes another, in these quarrels. In the long struggle of Henry IV. on the question of investitures the diets, less enlightened than the emperor, generally sided with the Pope. The Diet of Forsheim in 1077, which chose Rudolph of Suabia in opposition to Henry, decided that the empire should no longer be allowed to become hereditary, but should be bestowed on the most worthy. At Goslar (1099) Henry proposed a mixed tribunal, without appeal to the Pope, for trying ecclesiastical offenses, but to this proposal the ecclesiastical members refused consent. The Diet of Würzburg in 1121 proclaimed the pain of death against anyone who broke the internal peace of the empire.

The cities in which the diets were chiefly held during the Hohenstauffen dynasty were Mainz, Würzburg, Goslar, Bamberg, Magdeburg, Aix-la-Chapelle, Spires and Frankfort. At the Diet of Frankfort in 1147 Conrad III. established an imperial council at Rothweil. The numerous diets assembled under Fredcrick Barbarossa discussed questions of peace and war and supported the policy of the emperor. At one of these diets deputies from England appeared and recommended to the assembly, deliberating between the rival Popes Pascal and Alexander, the ancient usage of England of refusing to allow appeals to the Pope without the consent of the sovereign. The privileges of the towns also occupied the diets at this period. The Diet of Würzburg in 1168 issued a decree compelling bishops to receive consecration, the omission of that ceremony having become habitual, with a view to enable the bishops with a better conscience to devote their attention exclusively to secular affairs. The case of Henry of Saxony already referred to occupied several diets. In the reign of Frederick II. the diets were occupied in enlarging the powers of the clergy and princes and consequently in restricting that of the emperor. That of Mainz in 1235 also granted extended privileges to the cities. In the reign of Rudolph private wars were again forbidden, and the diets sanctioned the severe measures taken by the emperor against the robber nobles. From the time of Albert I. the diets began to manifest a strong opposition to the encroachments of the papal power. The Golden Bull occupied the Diets of Nuremberg and Metz in 1356. We here notice some peculiarities of this celebrated statute. It begins with a preamble in which the seven deadly sins are personified, and enter into a colloquy with the emperor, in which they get the worst of the arguments. It contains a provision that if the electors assembled for the choice of an emperor could not come to a decision within 30 days they should be fed on bread and water till they had concluded their deliberation.

The Diet of Nuremberg (1438) is of much importance, as its decrees embody the outline of a plan afterward completed by the Diet of Worms in 1495 for giving an organized force to the empire in order to secure the execution of the laws promulgated by the diets, and especially for the preservation of internal peace. Rudolph had established a jurisdiction of arbiters, called Austräge, selected by and of equal rank with the disputants, for settling disputes between the various States. The Diet of Nuremberg made formal regulations for this tribunal. To provide for the maintenance of peace and the enforcement of the decrees of the imperial council, the empire, with the exception of the estates of the emperor, the electors and the kingdom of Bohemia, was divided into four circles, each under a director who convoked the States of the circle, communicated to them the instructions of the emperor, and executed their decrees, and a duke, who commanded the military force and called on each member of the circle for his contingent. In consequence of this establishment of public justice the diet considered itself able to decree the suppression of the secret tribunal of the Fem. At the Diet of Worms held in 1495, the Emperor Maximilian consented to the establishment of a sovereign court called the Imperial Chamber, consisting of a chief judge chosen among the princes, and of 16 assessors, partly nobles and partly lawyers, all to be named by the emperor with the approbation of the diet. It was to exercise the same authority as the imperial council, hitherto chosen by the emperor himself, of deciding in the last resort in disputes, whether between States or individuals, but it was no longer to accompany the emperor, and its members being really appointed by the diet, it gave

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that body for the first time an independent power in the State. Its president had the power of pronouncing in the emperor's name the ban of the empire.

After the establishment of this tribunal the Diet of Worms proclaimed a perpetual peace. But the emperor in consenting to its establishment expressly reversed his own prerogative on which it seemed to infringe, and with the consent of the Diet of Augsburg (1500) he set up the Aulic Council in Vienna as a rival to the new tribunal. Thus the means of pacifying the empire became subsequently a cause of fresh disputes. In the diet of 1500 the empire was divided into six circles — Bavaria, Suabia, Franconia, Saxony, the Rhine and Westphalia. Maximilian afterward added four more, which included the imperial and electoral domains, those of Austria, Burgundy (Netherlands), Upper Saxony, and Upper Rhine. The Diet of Augsburg also established a permanent political council composed of a committee of the States, in which the electors, secular and ecclesiastical princes, and towns were represented, and by which the personal power of the emperor was still further restricted. This council, however, soon proved unequal to the task assigned it. From the latter part of Maximilian's reign till the peace of Westphalia in 1648 the most important subject which occupied the diets was the Lutheran Reformation and its consequences. From 1623, with the exception of a brief interval when they assembled at Frankfort, the diets met regularly at Ratisbon, and became gradually more subservient to the emperors. The power of the house of Austria had at last so overshadowed that of the other German houses that even the election of an emperor became merely the formal nomination of the head of that house.

Maximilian succeeded to the empire in 1493, as already mentioned. In 1496 his son Philip married Joanna, the daughter of Ferdinand and Isabella of Spain. By his own marriage with Mary of Burgundy he brought the Netherlands again into close relationship with the empire and revived claims on Burgundy which he was unable to maintain against the rising power of France. The French monarchy, consolidated by Louis XI., had already entered on the sphere of European politics, and with the invasion of Italy by Charles VIII. in 1494 had begun that contest for supremacy with the rival power of Germany, which, whether in the form of a conflict between rival monarchies, or of a deadlier struggle between opposed nationalities, has continued to the present day and seems yet undetermined. Maximilian invaded Burgundy in 1498, but was compelled to submit his claims to arbitration. With the support of the diet he also endeavored to revive the claims of the empire on Switzerland, and reduce it under the authority of the newly created Imperial Chamber. A bloody war ensued in 1499, in which he was defeated and compelled to make peace. He was constantly frustrated in his wars by want of means to keep his armies together. France, Spain, and Germany, after struggling and intriguing with alternate success for the supremacy in Italy, united in 1508 with the Pope in the celebrated league of Cambrai against Venice. Maximilian abandoned this league in 1511 to enter into another fomented by the Pope, and hence called the Holy league, with Spain and England against France. About the same time he made a curious attempt to get himself on the next vacancy elected Pope. In 1516 he invaded Italy, but the insubordination of his troops for want of pay compelled him to make an ignominious flight. In 1518 the affairs of Luther were first brought before the Diet of Augsburg. Maximilian died in 1519. He was succeeded by his grandson, Charles V., who had inherited the crown of Spain through his mother, and thus united under his sway a great part of Europe with the rich possessions of Spain in the New World.

The reign of Charles, the most important in the German annals and the most brilliant in the 16th century, was divided among three great conflicts — the continued struggle between France and Germany; the conflict with the Turks, whose encroachments threatened the hereditary dominions of the house of Austria; and the kingdom of Hungary, which, together with Bohemia, fell after the death of Louis II. at the battle of Mohacz to the emperor's brother Ferdinand; and the conflict with the Reformation. In the first of these Charles enjoyed his most brilliant successes, particularly in the victory of Pavia (1525), which made Francis I. his prisoner; but Charles' seeming preponderance of power was very nearly balanced by the more central position of France and the more available character of her resources, and after all his successes he only succeeded in bequeathing to his son Philip of Spain an unfinished war, suspended by a truce which left France in possession of Savoy and the frontier fortresses of Metz, Toul, and Verdun. The material results of this struggle in the various treaties with France which resulted from it will be found in our history of that country, and its various incidents and episodes, the alliances of both kings with England, the defection of Bourbon, the emperor's quarrel with Clement VII., the sack of Rome, in the respective biographies. The war with the Turks became formidable, when, after his victory at Mohacz (1526), Solyman set up a king of Hungary and laid siege to Vienna (1529); and his repeated invasions of Hungary and alliances with France continued to harass the empire till the close of Charles'

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reign. This war also had its episodes in the naval expeditions of Doria and the emperor to Tunis (1535) and Algiers (1541).

But the most important feature of Charles' reign was the struggle with the Reformation, and in it he can be credited with neither glory nor success. It cannot be disguised that his policy with the Reformers was tortuous. When his foreign policy required it, and particularly when pressed by the Turks, he made concessions freely; but when, with the active assistance of the Reformers he had been relieved from this danger and had been left at liberty by the peace of Crespy (1545) to attend to the internal affairs of the empire, he speedily withdrew his concessions. The league of Schmalkalden, with which the emperor had concluded the peace of Nuremberg in 1532, through the bad generalship and divided counsels which are inherent in such combinations, suffered a decisive defeat at Mühlberg in 1547; but Charles was not yet wholly master of the situation, and the famous Interim of the Diet of Augsburg in 1548 was the fruit of his victory. But this success was dearly purchased. Maurice, whom he had made Elector of Saxony, put himself at the head of a new league, which did not commit the faults of its predecessor, and extorted the treaty of Passau in 1552, by which the whole policy of the emperor's reign was overturned and the liberty of Protestant worship secured. In 1554 Charles negotiated the marriage of his son Philip with Mary of England. The treaty of Passau had provided for referring the religious disputes to a diet, and at the Diet of Augsburg in 1555 a religious peace was negotiated by Ferdinand, the emperor's brother. It contained two provisions, which ultimately aggravated existing differences and were a main cause in promoting the Thirty Years' War. The Lutherans were then the chief body of Reformers in Germany, but the Calvinists were rapidly increasing in numbers and influence. The toleration granted by the peace was limited to the followers of the confession of Augsburg. One of the great causes of difference between the Catholics and the Reformers was the great amount and peculiar tenure of ecclesiastical property to which we have already alluded. The secularization of this property was looked on as a profanation by the Catholics, while the Protestants could not be expected to see with complacency possessions which conferred political power and dignity to the extent of direct personal authority exclusively in the hands of their enemies. A large amount of ecclesiastical property had already been secularized through the conversion of its holders. This was in fact a powerful motive to conversion, as the Church did not give hereditary possession. The Catholics now succeeded in securing an article called the Ecclesiastical Reservation, by which any holder of an ecclesiastical benefice changing his religion should forfeit the benefice. This seemingly reasonable provision excited the strenuous opposition of the Protestants, and was only permitted to pass under protest. In 1556 Charles resigned the empire to his brother Ferdinand. The Netherlands and the Italian possessions, for which so much German blood had been spilt, had already been given with the kingdom of Spain to his son Philip. Charles retired to the monastery of St. Just in Estremadura, where he died in 1558.

The Pope refused to recognize the abdication of Charles and the accession of his successor, and declared the acts of the Diet of Frankfort (in 1558), which had acknowledged Ferdinand, null and void. Ferdinand in consequence assumed the title of emperor elect, and from this time coronation by the Pope was no longer deemed necessary by the German emperors. Ferdinand observed the religious peace and was chiefly occupied with the affairs of his hereditary dominions. He succeeded in making Bohemia hereditary and in 1562 concluded a truce for eight years with the Turks. The Council of Trent was concluded in his reign. He died in 1564. Maximilian II., son of Ferdinand, was distinguished for the moderation of his policy in regard to religion. He extended toleration to his hereditary dominions. Maximilian was in 1566 engaged in a fresh war with the Turks in Hungary, during which Solyman died from fatigues incurred in the obscure fortress of Szigeth. Maximilian died in 1576, while he was preparing to assert his claim to the crown of Poland. His son, Rudolph II., who had been brought up in Madrid, was, in contrast to his father, a Catholic zealot, and soon rendered himself unpopular by his persecution of the Protestants and by his complete incapacity for government. The Archduke Ferdinand of Styria, and Maximilian, Duke of Bavaria, also distinguished themselves by their zeal for the Catholic religion. The latter procured a decree of the Aulic Council putting the free imperial city of Donauwörth under the ban of the empire, and intrusting him with its execution. The proceedings which followed, known as "the troubles of Donauwörth," occasioned the formation of the Protestant Union, May 4, 1608. This was followed by a counter-association on the part of the Catholics (July, 1609), called the Holy league. A war with the Turks was favorably concluded by the peace of Sitvatorok in 1607. In 1609 Rudolph was compelled by his Bohemian subjects to sign a *Majestätsbrief* granting complete religious liberty, which was one of the proximate causes of the Thirty Years' War. He was forced in 1608 to resign to his brother Matthias the crown of Hungary, and in 1611 that of Bohemia. He died in 1612.

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Matthias, who succeeded him as emperor, was not a much better ruler than his brother, and Germany under his reign continued rapidly to become more disorganized. With the consent of his brothers he adopted his cousin, Ferdinand of Styria, as his successor, and resigned to him the crowns of Hungary and Bohemia during his lifetime. He died in 1619. Ferdinand II. was more capable than his two immediate predecessors; but his religious bigotry made his accession at this time a calamity to Germany. His Bohemian subjects were already in open revolt and offered the crown of Bohemia to the Elector Palatine Frederick V., who, though the Protestant Union was divided in opinion on the subject, decided to accept it. Frederick was defeated in the battle of Prague (Nov. 8, 1620), put under the ban of the empire, and deprived of his estates, which, together with the electorate, were given to the Duke of Bavaria in 1623. These events form the commencement of the Thirty Years' War, the details of which will be found in a separate article. The invasion of Germany by Christian IV. of Denmark in 1625, the peace of Lübeck (May 27, 1629), the invasion of Gustavus Adolphus (1630), the battles of Leipsic in 1631, of the Lech and Lützen in 1632, of Nördingen in 1634, the war with France in 1635, belong to the history of the Thirty Years' War, and the policy of Richelieu. The troubles of this period were increased by the edict of restitution passed in 1629, which revived the Catholic claims on all Church property secularized since the peace of Passau in 1629. Ferdinand died in 1637. His son, Ferdinand III., had gained a military reputation by the battle of Nördlingen, but he did not put it to the proof by taking the command of his armies. Baner, Frederick of Saxe-Weimar, Torstenson, Turenne, and the great Condé gained repeated victories over his troops. He was at length induced to enter into negotiations. The war, through complication with the affairs of Spain and the Netherlands, had gradually extended throughout Europe.

A congress of nations was opened in the towns of Münster and Osnabrück, the Catholic powers being represented at the former and the Protestant at the latter (1643); and after some years of fighting and negotiation the Thirty Years' War was concluded by the peace of Westphalia (Oct. 24, 1648), in which the policy of France and Sweden was triumphant. The principal conditions which concerned Germany were a general amnesty and restoration of rights; the Upper Palatinate was retained by Bavaria, the lower, with a new electorate, was restored to Charles Louis, son of Frederick V.; the diets of the empire were to have the sole power of making and interpreting the laws, of levying taxes, raising troops, making treaties, and declaring war; the imperial chamber and the aulic council were to be reformed so as to give greater power to the Protestants; and the right of the princes and States to make war and alliances among themselves or with foreigners was recognized. Thus the policy of the Diets of Nüremburg, Worms, and Frankfort was defeated, and the consolidation of the German empire frustrated, the great aim of Richelieu. The bishopries of Metz, Toul, and Verdun, with Breisach, Upper and Lower Alsace, and 10 imperial cities, were ceded to France; the independence of Switzerland was acknowledged, and the claims of the empire on the Netherlands abandoned, and some cessions of territory were made to Sweden.

After the peace of Westphalia Ferdinand continued to afford the Spaniards material assistance in their war with France. Two leagues formed in Germany after the peace of Westphalia, called respectively the Catholic and the Protestant league, enabled France to maintain its influence in the affairs of Germany, and several of the German princes entered into the French alliance. The peace of Westphalia was confirmed by the Diet of Ratisbon in 1654. The emperor died in 1657. His son, Leopold I., was already King of Hungary and Bohemia (1655–1656). He was elected emperor in 1658, although the French ambassadors who were admitted to the electoral diet made an effort to divert the imperial crown from the house of Austria. They succeeded in imposing as a condition of his capitulation that he should not assist the enemies of France in the war then in progress. Further to secure the neutrality of Germany in the war with Spain, Mazarin also succeeded by his influence with the ecclesiastical electors in combining the two leagues, Catholic and Protestant, into one called the Rhenish league, under the protection of France, for the maintenance of the peace of Westphalia. This league was tacitly recognized by the emperor, who received a contingent of troops from Louis XIV., as a member of it, in the Turkish campaign in 1664. The treaty of Oliva in 1660 put an end to the war, in which Sweden, Poland, Denmark, and the electorate of Brandenburg were more concerned than the empire. In 1668 Leopold entered into the first of the series of treaties with France in regard to the claims of both monarchs to the Spanish succession, which ended in the establishment of the Bourbons on the throne of Spain. The success of Louis XIV. in his invasion of Holland led to a coalition against him, in which the emperor after temporizing for some time joined (Aug. 30, 1673). The war was continued for some years and terminated by the peace of Nimeguen, acceded to by the emperor on Feb. 5, 1679. A formidable war

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with the Turks broke out in 1663. Vienna, besieged in 1683, was saved by John Sobieski, King of Poland. In 1684 the Holy league was formed against the Turks with the King of Poland and the republic of Venice, and the war was continued till 1699, and concluded by the peace of Carlowitz, when the Turks abandoned their claims in Hungary, Transylvania, and Slavonia.

The intolerance of the Austrian government and the persecutions of the Protestants had caused various insurrections in Hungary, and led the Protestants even to favor the Turks, who did not molest them. In 1687 Leopold proposed to the States of Hungary to incorporate his conquests from the Turks in that kingdom, and grant religious liberty, if they would abandon their constitution and make the kingdom hereditary. This being acceded to his son Joseph was crowned King of Hungary. The emperor, with other German princes, joined in the league of Augsburg (July 9, 1686) against Louis XIV. A protracted war, distinguished by the devastation of the palatinate, was concluded by the peace of Ryswick, acceded to by the emperor Oct. 30, 1697. In 1692 the emperor erected Hanover into an electorate on terms which offended some of the German princes, and in 1700 he permitted the Elector of Brandenburg, Frederick III., to take the title of King of Prussia. The war of the Spanish Succession, in which Great Britain, Holland, and the empire were leagued against France, was begun in 1702. The Emperor Leopold died in 1705. He was succeeded by his son, Joseph I. At the commencement of his reign insurrections occurred in Hungary and Bavaria; the Electors of Cologne and Bavaria were put under the ban of the empire; the estates of the latter were divided, and the Upper Palatinate was restored to the elector palatine. The success of the imperial arms enabled the emperor to revive the claims of his house upon Italy. Joseph died in 1711. He was succeeded by his brother, Charles VI., the claimant of the Spanish crown. The alliance against France was dissolved by the peace of Utrecht in 1713, to which the emperor refused to accede, and was left alone against France.

After a brief campaign between Prince Eugene and Villars he acceded to the treaty of Rastadt, negotiated between these commanders March 7, 1714, on his own behalf, and on behalf of the empire at Baden Sept. 7, 1714. The Spanish Netherlands, and Naples, Milan, Sardinia, and other Italian conquests, were left to the emperor. By the Barrier treaty (Nov. 15, 1715), between the emperor and the States-general of the United Provinces, an arrangement was made for the joint garrisoning of the fortresses of Namur, Tournai, Ypres, etc. A short war against the Turks, conducted by Prince Eugene, ended by the peace of Passarowitz (July 21, 1718) in further acquisitions to the hereditary possessions of Austria. The quadruple alliance formed by England, France, Austria, and the United Provinces (1718–1719) against Spain provided for mutual renunciations on the part of Philip V. and the emperor of their respective claims on Spain and the Netherlands, and a readjustment of possessions in Italy, where war had already broken out between them. Spain acceded to the alliance after a brief resistance in 1720. Its most important consequence was the erection of the kingdom of Sardinia under Victor Amadeus II. of Savoy. The emperor having no male heirs had promulgated in 1713 the pragmatic sanction regulating the succession to his hereditary dominions in favor of his daughters in preference to those of his brother, Joseph I. This was acceded to by the States of Austria in 1719, and afterward by the other hereditary States, and having been subsequently guaranteed by England, Holland, Spain and France, eventually led to the war of the Austrian Succession.

A disputed succession to Poland led to a war between France and Austria in 1733, in which the French attacked the Italian provinces of the emperor and invaded Germany. Peace was concluded at Vienna Nov. 18, 1738, by which the emperor lost Naples and Sicily and part of his possessions in Northern Italy and acquired the duchy of Parma, while the Duke of Lorraine, who was to marry his daughter, Maria Theresa, received the arch-duchy of Tuscany in exchange for his own duchy, and France guaranteed the pragmatic sanction. In 1737 the emperor joined Russia in a war with the Turks. Peace was concluded in 1739 on unfavorable terms, Austria surrendering Belgrade and agreeing to evacuate Servia and Walachia. The emperor died in 1740. Charles Albert, Elector of Bavaria, son-in-law of Leopold I., was chosen emperor in 1742, and crowned with the title of Charles VII. He laid claim to the hereditary possessions of the house of Austria, and had already occupied Bohemia and been crowned king of that kingdom in 1741. He had also entered into an alliance with France, Spain, Prussia, etc. (treaty of Nymphenburg), against the claims of Maria Theresa, who was supported by England, Holland, Poland, etc., called the Alliance of Hanover. Thus was begun the war of the Austrian Succession (see AUSTRIA). Charles VII. was speedily driven out of Bohemia, and lost even his hereditary States of Bavaria, which Marshal Seckendorf recovered for him. He died in Munich in January, 1745. Francis I., Grand-Duke of Tuscany, the husband of Maria Theresa, was elected emperor at Frankfort

on Sept. 13, and thus the house of Hapsburg-Lorraine, which had succeeded to the hereditary possessions of Austria, was recognized as the head of the empire. The war of succession was concluded by the treaty of Aix-la-Chapelle (Oct. 18, 1748), to which the emperor was not a party, though the empire lost by it some of its Italian fiefs. The chief result of the war was the annexation of Silesia to Prussia.

This peace was followed after a brief interval by the Seven Years' War (1756–1763), excited by the desire of Maria Theresa to recover Silesia, in which war Austria, Russia, and France, with Saxony and other powers, combined together against Prussia. This war was concluded by the peace of Hubertsburg (Feb. 15, 1763), in which the empire was included. Prussia retained her acquisitions and Frederick II. agreed to suport the election of the eldest son of Maria Theresa as King of the Romans. The death (in 1765) of Francis I., who had exercised little influence on political events, led to the succession of this prince as Joseph II. He was of an active and reforming disposition. He joined with Russia and Prussia in the first partition of Poland (1772). The Bavarian line having become extinct, the elector palatine succeeded to it after a war terminated by the peace of Teschin (May 13, 1779). Maria Theresa died in 1780, and Joseph succeeded to the Austrian dominions, of which he had been coregent since 1765. In 1781 he put an end to the Barrier treaty, and razed the fortresses which the Dutch were entitled by it to occupy. In the same year he issued a decree abolishing monastic orders and making other ecclesiastical reforms, and also an edict of religious toleration.

These reforms, which procured him the title of the philosophic emperor, caused much discontent to his Catholic subjects and, together with other grievances, caused a revolt in the Netherlands (see BELGIUM), which was not suppressed till after his death, which occurred in February, 1790. He was succeeded by his brother Leopold. His domestic policy was reactionary and he joined with Frederick William II. of Prussia in the celebrated Declaration of Pilnitz (Aug. 27, 1791) against the promoters of the French Revolution. He died March 1, 1792, and was succeeded by his son, Francis II. Francis confirmed the alliance of his father with Prussia, and was immediately involved in war with France. He joined in 1793 in the second partition of Poland. He took the command of his army against the French in 1794, concluded the peace of Campo Formio with Bonaparte (Oct. 17, 1797); joined the second coalition against France in 1799 and concluded the treaty of Lunéville (Feb. 3, 1801); joined the third coalition in 1805, and concluded the treaty of Presburg (Dec. 26, 1805). The results of these treaties will be found in our history of France. In 1804 Francis took the title of hereditary Emperor of Austria, and after the peace of Presburg, the German empire having been virtually dissolved by the Confederation of the Rhine, he renounced on Aug. 6, 1806, the title of its head. From this period till 1815 there is no united history of Germany.

The States of Germany were again united by the treaty of Vienna (1815), in a confederation called the German Confederation (*der Deutsche Bund*); its proceedings, however, possessed for a time very little interest or importance. In 1818 a general commercial league called the Zollverein, was projected by Prussia and was gradually joined by most of the German States except Austria. Germany had during the French Revolution imbibed liberal ideas which caused frequent troubles in the different States and more general outbreaks in 1830 and 1848. In the latter year the confederation underwent a revolution, and a constituent assembly was substituted for the diet. The diet was reëstablished in 1851. A reform of the confederation proposed by Austria in 1863 and accepted by the diet was rejected by Prussia. In 1866 the majority of the diet supported Austria in her dispute with Prussia respecting the disposal of the duchies of Schleswig and Holstein which had been jointly occupied under the authority of the confederation, whereupon Prussia withdrew from the confederation and declared it dissolved. The Seven Weeks' War between Austria and Prussia ended in the defeat of the former, the loss of her Italian possessions, and her exclusion from the German Confederation which was reformed by Prussia under the title of the North German Confederation. Peace was signed at Prague between Austria and Prussia on Aug. 23, 1866. Secret treaties of alliance had previously been entered into between Prussia and Würtemberg (Aug. 13), Baden (Aug. 18), and Bavaria (Aug. 22). These were made public on March 23, 1867. The next great event was the war with France, which arose out of an offer of the crown of Spain to a Prussian prince (see FRANCO-PRUSSIAN WAR), and resulted in the triumph of the German arms. In this great struggle the South German States as well as the North German, supported Prussia. When the result of the war was no longer doubtful, the King of Prussia was invited to assume the title of German emperor, and he was accordingly proclaimed at Versailles on Jan. 18, 1871. The parliament of the new German empire met at Berlin on March 21, and the constitution was adopted. The Emperor William I. died on March 9, 1888, and was succeeded by his son Frederick, who died on June 15 of the same year. Frederick's elder surviving son then as-

cended the imperial throne as William II., and has shown himself to be a monarch with a mind and will of his own, and a man of striking and somewhat peculiar personality.

The consolidation of the German empire was largely the work of Prince Bismarck, who became the first imperial chancellor. He successfully sought to secure Germany from attack, so as to enable her to develop her industries in peace, partly by the maintenance of a powerful, well-trained army, and partly by alliances with other powers. In 1879 he formed an alliance with Austria, and three years later with Italy. This Triple Alliance, as it is called, has been renewed in several subsequent years. During the earlier years of the reconstituted empire he was engaged, with the support of the powerful National Liberal party, in a contest with the papacy regarding the relations between the imperial government and the Roman Catholic religious societies of Germany. The Jesuits and similar orders were expelled in 1872, and a law was passed in 1874 making marriage a civil contract; but in 1880 and the years immediately following he found it expedient to open negotiations with papal representatives. Ultimately he admitted defeat by practically repealing the "Falk laws," as the anti-papal legislation was called after a Prussian minister of worship, and with this repeal the long so-called "*Kulturkampf*" ended. It was Bismarck who in 1884 inaugurated German colonial development by declaring a protectorate over territories in Southwest Africa. Since then Germany has acquired Togoland, the Kamerun region, German East Africa, part of New Guinea, the Marshall, Caroline, Pelew, and other island groups in the Pacific, beside one of the Samoan Islands. In his campaign against social democracy which has become an important factor in German politics, Bismarck did not rely exclusively on force and repression. He sought to destroy the social discontent in which much of the strength of Socialism lay by passing measures intended to improve the condition of the working classes. In this respect his policy has also been maintained to the present time.

Probably the most striking feature in the recent history of Germany is the rapid development of its manufacturing industries and its foreign trade. The mercantile navy is steadily growing in size and importance, and the emperor has recently induced the Reichstag to vote large amounts for the increase of the war navy.

GERMAN ART.— I. *Architecture.*— During the whole of the period which elapsed between the withdrawal of the Romans and the reign of Charlemagne Germany seems to have been in such a state of anarchy that no great buildings were or could be undertaken. At all events no trace of any edifice of this age remains, nor even a tolerably distinct tradition of any one being founded by the unsettled barbarian tribes who occupied that country when deprived of the protection of the Roman empire. With the accession of Charlemagne commences a brighter era. He restored the authority of the laws, and encouraged the arts of peace, and founded many noble structures, some of which, in whole or in part remain to the present day. This gleam of tranquil brightness appears to have been more owing to the individual greatness of the sovereign than to the ripeness of the people for more civilized institutions; for on his death they relapsed into confusion and barbarism. From this state the land partially recovered under the first three Ottos, in whose reigns church building seems to have been renewed with some energy. Up till the end of the 12th century the prevalent style of architecture was the Byzantine, the low state of German civilization compelling the employment of Greek or Italian artists. The cathedrals of Spires, Worms, Mainz, Bamberg, Basel, Würzburg, Limburg, Erfurt, Treves, Nuremberg, all conform in their primitive parts to the Byzantine style. But about the 12th century the Gothic began to make its appearance; from that time the ogival and semicircular arch were both in equal favor.

Toward the close of the following century the Gothic, as a purely German style, replaced those brought from the S. The churches of that period are all of the pure Gothic character. Such were the cathedrals of Meissen and Magdeburg, buildings of a severe and simple taste. This style was succeeded by a second, not less grand, but more ornate and elegant. The Cathedral of Freiburg opened this new era; its front spire, erected in 1272, is the first and finest in the open style, and altogether the church is the most perfect monument of Gothic art remaining. The cathedrals of Cologne and Strassburg were both commenced about the same epoch. The latter edifice has a peculiar interest for the student of art, as in it is plainly marked the progress of architecture from the heavy Lombardo-Byzantine style to the degenerated after-Gothic style. In spite of these traces of bad taste the Strassburg Cathedral was considered in the Middle Ages and at the era of the Renaissance the finest structure in Germany. The fourth *chef d'œuvre* of German art is the Church of St. Stephen at Vienna, commenced about the middle of the 12th century. It is regarded as the last expression of the pure Gothic style. Among the other noble churches of this epoch may be mentioned those of St. Laurance and of St. Sebald, the latter remarkable for its Gothic general plan with Arabic ornamentation; that of St. Mary in the same town,

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by Georg and Fritz Ruprecht; St. Catharine's of Oppenheim, the Cathedral of Goslar, St. Mary's of Königsberg, etc. The 14th and 15th centuries witnessed the erection of the magnificent Cathedral of Ulm, commenced under the direction of Matthias von Ensingen, and continued by Boblinger and Engelberger; the Cathedral of Augsberg; the beautiful church of Landshut; that of Esslingen, renowned for its elegance; that of Dunkelsbühl, by Nicolas Eseller; St. Giles' of Prague, constructed by Peter von Arler and Matthias von Arras; St. Mary's of Würzburg, the cathedrals of Innspruck, Salzburg, Bremen, Dantzig, Constance, Berne, Zürich, Lausanne, etc. Among the most remarkable monasteries must be classed those of St. Gall, Fulda, Lindau, Lorsch, Treves, Hildesheim, St. Blaise in the Black Forest, Einsiedeln in Switzerland, etc.

Civil architecture took its rise shortly after ecclesiastical. After the towns had succeeded in securing their freedom and become prosperous, they first erected a church to their patron saint, and then constructed handsome council halls, bridges, quays, custom houses, immense warehouses, hospitals, etc. All these edifices are characterized by their simple and elegant forms, appropriate to the uses for which they were intended. The public buildings of Dresden, Ulm, Goslar, Bremen, Nuremberg, Cologne, and Mainz, are among the most celebrated specimens. About the beginning of the 15th century the pure Gothic art commenced to decline. The sanguinary religious wars of Bohemia destroyed the unity of belief, and diminished the spirit of enthusiasm which had led to lavish expenditure in the interest of the church. From that time new ecclesiastical structures were not only not undertaken, but those partially built were for long left unfinished. The war of the Hussites, and the Reformation inaugurated by Luther, were fatal to the magnificent old Gothic style. About this time the revival of art in Italy was making itself felt, and Germany, in consequence of her relations with that country, adopted in some measure the ideas of the Italian architectural school; and though in the churches several of the ancient forms were adhered to, the new style soon gained complete possession of the field. As instances of a compromise between the two styles we may cite the Jesuits' church at Munich; the town hall and the tower at Perlach; the churches of St. Charles and St. Peter at Vienna (the last-mentioned on the plan of St. Peter's at Rome).

This style, characterized by its intricacy of outline and prodigality in ornamentation, prevailed up till the end of the 18th century, when three eminent men, Raphael Mengs, Winckelmann, and Lessing, opened their campaign in favor of purer and more dignified forms. Weinbrenner, an architect of Baden, animated by their spirit, lent his powerful aid, and became the head of a school which, in spite of its imitation of classical antiquity, has given Germany a host of learned and enlightened architects: Hansen, who found a sphere of activity in Hamburg and Denmark; Fischer, who planned the Munich theater, and others. After them the school (called the archæological and æsthetical) was represented by Klenze. This architect, in the many edifices erected from his designs at Munich, has shown a wide and profound knowledge of the various styles of architecture. The Glyptothek is Ionian in style; the royal palaces, Florentine; the church of All Saints is Byzantine; several details of the Pinakothek are borrowed from the Vatican; and in the Valhalla of Ratisbon he has imitated the rude Cyclopean walls. His royal patron, Louis of Bavaria, who merits the title of regenerator of the arts, employed many other famous architects, such as Gästner, Ohlmüller, Liebland, Pertsch, and Probst, and had the honor of leaving to his country a city of palaces. The King of Prussia followed his example to some extent, and his architect Schinkel planned many of the best edifices in Berlin and the provinces. Among his principal works in the capital are the royal palace, the museum, the theater, the conservatory, etc. Knoblauch is a more recent architect, who erected some fine buildings in Berlin; while Semper is equally distinguished for edifices erected in Zürich, Dresden, and Vienna.

II. *Painting.*—Though painting in Germany can be traced back to the age of Charlemagne, little is known of the productions of its artists, the missal illuminators alone excepted. The dome of the cathedral erected by that monarch at Aix-la-Chapelle he caused to be covered with mosaics representing Christ enthroned with the elders worshiping; the walls of his palaces glittered with representations of his own victories; his oratories with Scriptural subjects or legends of the saints — all the work of foreign artists of the Byzantine school. Of these paintings and mosaics no vestiges remain. The Byzantine influence was predominant up till about the middle of the 12th century, when visible signs of new life in art began to manifest themselves. Ecclesiastical art took a wider scope; more artistic individuality was displayed; the drawing of the figure was improved, and expression was studied. The miniature painters especially made a marked advance, and many excellent specimens of their work remain. In the "Parzival" of Wolfram von Eschenbach, who lived early in the 13th century, the painters of Cologne and Maestricht are especially mentioned; and the series of compartments on the ceiling of the former monastery of

Brauweiler near Cologne, of about 1200, representing the Triumph of Faith; and the figures of the apostles, one of which bears the date 1224, in the church of St. Ursula in Cologne, are probably the oldest German pictures extant. But a more important work is the series of paintings on the choir and transept of Brunswick Cathedral, which appear to be of about the middle of the 13th century. A school of very skillful artists seems to have existed about this time in Bohemia, but toward the close of the 14th century the painters of Cologne recovered the lead under Meister Wilhelm, who is described by a contemporary writer as the best master of his day, who painted all sorts of men as if they were alive. The pictures in Cologne attributed to this master and his scholar Meister Stephan, notwithstanding a Gothic hardness peculiar to all mediæval German art, are remarkable for richness of coloring, careful finish, and deep religious sentiment. Contemporary schools flourished in Nuremberg and Westphalia.

The 16th century witnessed the culmination of German art in the person of Albrecht Dürer, the scholar of Michael Wohlgemuth of Nuremberg, and almost equally distinguished as painter, sculptor, and engraver, though now chiefly known in the last capacity. In feeling for ideal beauty Dürer is far inferior to his great Italian contemporaries; in color he is inferior to both the Italian and Flemish artists; but in originality of conception, fertility of imagination, dramatic power, force of expression, and correctness of drawing, he ranks with the highest. He found a numerous host of imitators, many of whose works in the various European collections are attributed to the great master. Among the principal of his disciples are Hans Wagner, Schäufflein, Beham, and Albrecht Altdörfer, the best of all his pupils. The contemporary school of Saxony was headed at this time by Lucas Cranach, who enjoyed almost as great a reputation as Dürer himself. His pictures are well colored but fanciful, and the features of his females most singular. Other painters of the period are Matthias Grunewald; Hans Burgkmair, chief of the Augsburg school; and more particularly Hans Holbein the younger (1498–1554), the type of old German realism, and, like Dürer, also great as an engraver, as shown in his "Dance of Death." The German painters of the 17th century were nearly all imitators of the Dutch, Flemish, or Italian masters, and many of them resided permanently in the Netherlands or Italy. Joachim von Sandrart (1606–1688), Heinrich Schönfelds (1609–1675), Heinrich Roos, and his son Philip Roos (1655–1705), better known as Rosa di Tivoli, were among the best German artists of this period.

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In the 18th century, painting in Germany as elsewhere, was coldly academic and conventional, devoid of all originality and feeling. Rode (1725–1797), J. H. Tischbein (1722–1789), and Raphael Mengs (1728–1774) are among the few painters of the century whose names are still remembered. In the early part of the 19th century a remarkable revival was commenced by a number of young German painters resident in Rome, who protested against the effete academic generalization under which art languished. The result was the formation of a mystical school, which, under the guidance of Overbeck, Veit, Schadow, and others, has attempted to revive the sentimental ascetic art of the 14th century; and of another more purely Teutonic school, under Cornelius, Kaulbach, Hess, and Schnorr, who have idealized history with considerable success. In opposition to the essentially Catholic school of Overbeck, a Protestant one has sprung up in Düsseldorf under Lessing, Bendemann, Knauss, Hübner, Röder, etc., which, though inferior to its rival in grandeur of conception has given to Germany her best contemporary landscape and genre painters.

III. *Sculpture.*— The origin of this art in Germany is to be sought in the labors of the monks; the ornamentation of their sacred vases, the carvings on the ivory covers of their missals, shrines, and the fronts of their altars, were the first essays in the art. The working of the Hartz mines, under the auspices of the first three emperors of the name of Otho, brought a considerable quantity of the precious metals into Germany, and for works in gold and silver the Germans acquired a European reputation. It is not, however, until we come to the 14th century that we meet with the names of any sculptor of importance. Johann of Cologne, Berthold of Eisenach, and Sabine of Steinbach (daughter of the architect of Strassburg Cathedral), have perpetuated their names; but those of the artists who sculptured the colossal statue of Rudolph IV. at Neustadt, that of William Tell at Zürich, the sculptures of the town hall at Nuremberg, have been forgotten. In the 15th century the school of Nuremberg became the most renowned in Germany, its members carrying the art to higher perfection than had ever been attained in the country. The most important names of this era are Johann Decker, Adam Kraff, Veit Stoss, Seb. Lindenast, but above all Peter Vischer, who even yet has found no rival among his fellow countrymen. His principal work is the tomb of St. Sebaldus in the church of the same name in Nuremberg. From this time up till the close of the 18th century Germany produced scarcely a single artist worthy of the name. The only sculptor who acquired any considerable reputation was Matthias Collin, who

adorned with superb sculpture the tomb of the Archduke Maximilian of Austria at Salzburg. The efforts of Mengs, Lessing, and Winckelmann, however, arrested the downward progress of the art, and the successes of the great masters Canova and Thorwaldsen encouraged the German sculptors to a patient study of ancient classical art. A revival soon took place, inaugurated by Dannecker, Ohnmacht, and by Schadow, Rauch, and Tieck, the heads of the modern Berlin school. Under the generous fostering care of King Louis of Bavaria, his capital was enriched by the productions of the great artists who founded the Munich school — Eberhard, Wagner, and more particularly Schwanthaler, who has almost arrived at the perfection of the ancient Greek masters. In conclusion we may mention the names of Kiss, one of Tieck's most promising pupils; of his fellow-disciple Drake; and of the brothers Eberhard, especially of Conrad Eberhard, who has applied the principles of the romantic school to German sculpture.

IV. *Music.*— Of the music sung by the ancient Germans to their songs of war and festivity; of the old church music introduced into the country by the teachers of Christianity, and which the chroniclers say was powerfully instrumental in converting the Saxons and Slavs; and even of the melodies of the courtly Minnesänger and the earlier Meistersänger, not a single trace exists. The first authentic monuments we possess of the art is found in a collection of hymns by Johann Hus or Huss, the reformer. In the 15th century a knowledge of the art was quite common in Germany, and the compositions of Heinrich Isaac, Adam de Fulda, Stephan Mahn, and others, will contrast favorably with those of the musicians of any nation whatever. The German people before the period of the Reformation had taken considerable interest in sacred music, and had on various occasions manifested a wide-spread desire to take part in the musical service of the Church; this the ecclesiastics seemed determined to repress, by the employment of trained choirs, instrumentalists, and the introduction of musical compositions of a very elaborate character. Luther, the leader of the Reformation, however, took a totally different course. A musician of no mean note himself, he composed several majestic chorals, and succeeded in rendering the sacred service of song at once popular and magnificent. Even at this period music of a less severe cast was not neglected; witness the works of Jacob Gallus, Schütz, Schein, Vulpius, and Prätorius, etc. In 1627 the opera of "Daphne," the libretto adapted by Opitz from the Italian, the music composed by Schütz of Dresden, was produced in that city, and may be considered the first attempt to introduce the opera pure and simple on the German stage. It was not, however, till the beginning of the 18th century that the Germans produced operatic music possessing considerable merit and impressed with national character. Keyser of Hamburg, and Fux of Vienna, were not mere imitators of the Italian musicians, as many of their predecessors had been. Later on in the century we come on the names of J. S. Bach and Handel, the great oratorio composers; Hasse, Graun, Telemann, in the opera and cantata; Em. Bach, famous for his instrumental music; Glück, the founder of the modern opera; Haydn, in oratorio and instrumental music; Mozart, the master of all styles; and the giant Beethoven, who has, in the opinion of many, carried the musical art to its utmost limits. In the 19th century the art has found worthy exponents in Franz Schubert, Spohr, Weber, Marschner, F. Schneider, Mendelssohn, Meyerbeer, Schumann, and others; together with Richard Wagner, whose theories have for two or three decades divided the musical world into two hostile camps. In nearly all kinds of instrumental music the Germans may be said to have surpassed all nations; the music of wind instruments seems to belong exclusively to them. Their organists are unrivaled, and their orchestras are well regulated. In musical literature none can approach them; witness the works of Fux, Matheson, Marpurg, Kirnberger, E. Bach, Albrechtsberger, Forkel, Koch, and a host of others. At the present time it is not surprising that the success of the Germans should be so extraordinary, seeing that there is no school for the education of youth in the country at which music is not thoroughly taught and cultivated, even down to those in which children receive gratuitous instruction.

Germany in the 19th Century. In a century characterized by unprecedented changes in the economic, the social, and the political life of the civilized world, no European people has made so substantial an advance as the German. At the close of the 18th century Germany was little more than an ethnographical conception; today it is a strong federal State. Then its people had practically no voice in legislation and no control over their governments; today they have local self-government and representation in State legislatures and in an imperial Parliament. Then it was substantially an agricultural country; today it is the second of the European States in industry and commerce.

At the outbreak of the French Revolution, the Holy Roman empire of the German nation still extended over a larger area than that covered by the present empire, but its unity was a legal fiction. It included the principal territories of two European powers, Austria and Prussia; and, by virtue of

hereditary possessions or conquests within its boundaries, the Kings of Great Britain, Denmark, and Sweden were numbered among its princes. In included more than 300 ecclesiastical and secular principalities; some 1,600 imperial knight fees, each knight ruling, on an average less than 300 subjects; half a hundred free imperial cities, and nearly as many imperial villages. All of these 2,000 political units were "immediate"—that is, no one stood between them and the emperor; but over none of them had the emperor any real authority. Such governmental power as still resided in the empire was held by the princes and the free cities, acting collectively, but from these estates it had become impossible to secure any important action. Within the single territories there was a thoroughly mediæval variety of forms of government, but by far the greater part of Germany was ruled absolutely, and in many cases despotically.

The law of Germany was as multiform as its politics. There existed an imperial code of criminal law and procedure dating from 1532, but local customs and laws took precedence over its provisions. In private law the apparent unity established at the close of the Middle Ages by the reception of the Roman laws, civil and canon, was (fortunately for Germany's future) far from complete. The old German law held somewhat of its own in the form of innumerable local customs; and these, left isolated, grew more and more diverse. In consequence of the Reformation, the Roman canon law lost its universal authority, and in half of Germany, church and family relations were governed by Protestant ecclesiastical law. Finally, as the greater territories rounded into States, new codes, criminal and civil, began to appear, each, of course, different from the others. A far more serious matter than the diversity of local and confessional laws was the diversity of legal rules for different social classes. The law not merely recognized class distinctions, but endeavored to perpetuate them. As elsewhere on the Continent, the great bulk of the people were bound to the soil in hereditary serfdom.

Non-agricultural industry, except of the simplest sort, was restricted to the towns and governed by the guilds. Trade was fettered by guild regulations, embarrassed by variations of weights, measures, and coinage, and impeded by transit tolls on roads and rivers and by import and export duties. The number of petty sovereigns levying tolls and duties made this burden almost intolerable; but the rulers of the larger States increased it by barring province against province and city against country. On the high seas, where the German merchant escaped from these impediments, he was handicapped by lack of protection; for neither the empire nor any of the German States possessed sea power. Under such conditions neither industry nor commerce was able to develop freely; and, till the 19th century was well advanced, Germany remained essentially an agricultural country. The population of the territories which constitute the present empire cannot have been, in 1800, more than 22,000,000.

In consequence of its disunity Germany had become the battle ground of Europe, and had lost much of its earlier bulk. In the wars occasioned by the French Revolution it suffered further losses and even greater humiliation. Austria and Prussia were deprived of most of their Polish territories. Austria lost also its W. and S. W. frontiers, and with the latter all its Mediterranean ports; Prussia lost all its provinces W. of the Elbe. The entire left bank of the Rhine, and Northwestern Germany as far as Lübeck, were annexed to France. The rest of Germany—all that was not (or was no longer) Austrian or Prussian, and all that was not Swedish or Danish or French—entered into alliance with Napoleon and formed a confederation of which he was protector. Of all the changes of these tremendous years, the passing of the old German empire seemed the least revolutionary. It was in fact but the tardy burial of a thing long dead.

These catastrophies were the beginning of the making of the new Germany. When the left bank of the Rhine was ceded in 1801, nearly 100 German principalities and free cities and a great number of knight fees were transformed into four new French departments. When the secular princes who had lost territory by this cession were indemnified at Regensburg in 1803, the indemnifying material was obtained by mediating all of the remaining free cities but six, and all of the ecclesiastical territories but two. In the formation and development of the Rhenish confederation, Napoleon sacrificed another hecatomb of petty principalities, two more free cities, and all the rest of the knight fees. In the course of these changes the immediate imperial villages also disappeared. When Germany was restored to its pre-revolutionary boundaries in 1815, it consisted of but 38 political units: Austria, Prussia, and four smaller kingdoms; 28 grand duchies, duchies, and principalities, and four free cities.

French rule gave Germany some of the best results of the French Revolution. Feudal tenures of office and of land, manorial jurisdiction and serfdom, all privileges and disabilities of birth, were swept away. Religious liberty was established, and all religious disabilities were removed; Jews were admitted to citizenship. The law was simplified; legal proceedings were conducted orally and publicly, and trial by jury

was introduced in criminal cases. Industry and trade were freed from the restrictions of the guilds; provincial customs lines disappeared; a uniform system of weights, measures, and coinage was established. It is scarcely an exaggeration to say that the territories annexed to France were brought at one bound out of feudalism and the Middle Ages into the 19th century and the modern State. Similar reforms were introduced, in greater or less measure, in most of the States of the Rhenish Confederation; and the benefits introduced by French rule or French influence were retained for the most part, when France was driven back within her old boundaries.

In Prussia, also, after the catastrophe of Jena had demonstrated the necessity of a thorough political and social reorganization, many similar reforms were initiated. Hereditary serfdom was abolished throughout the kingdom. The peasants, however, were not relieved from their compulsory services; and not till 1821 were these services replaced by rent charges. An attempt, initiated in 1811, to create peasant freeholds by dividing the land between the peasant occupants and the lords of the manors, and by freeing the land allotted to the peasants from all services and burdens, was strenuously resisted by the nobles; and in the end only a minority of the peasants received allotments. The majority, especially in the E. provinces, fell into the position of landless day laborers. These, deprived of the hope of bettering their position, have emigrated in such numbers, particularly during the latter half of this century, that the landholders have long been embarrassed by the scarcity of agricultural laborers.

Other Prussian reforms similar in character to those introduced through French influence, were the establishment of religious liberty and the removal of the disabilities of the Jews; the abolition of class and guild restrictions upon the purchase of land and upon the exercise of industries and trades; and the reform of the central administration. Two new things, however, appeared in Prussia in this period — things that were not inspired by the French example, and that were destined beyond all other reforms to strengthen Prussia and to place it at the head of a united Germany. These were the system of local self-government, established by the Cities Ordinance of 1808, and the system of universal military service, without the French right of exemption by substitution. The reforms introduced in Prussia and the patriotism and devotion of its people enabled this State, in spite of the fact that it had been reduced to a population of 5,000,000, to take a leading part in the War of Liberation and to reappear in 1814 at the Congress of Vienna, as a State of the first rank.

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From the War of Liberation the German people emerged with a stronger sense of national unity and a stronger desire for national organization than they had ever before manifested. Almost equally strong was their desire for a share in the life of the State, for constitutional government. Neither of these desires was satisfied by the arrangements made at Vienna in 1815. The Congress of Vienna united the German States and cities in a German confederation, and declared that each State would establish a constitution representing its territorial estates; but the confederation was so loosely organized as to prove impotent, and the promise of constitutional government was not, as a rule, loyally interpreted or promptly fulfilled in the single States. In the first years of the confederation, the South German kingdoms and a few of the Central German principalities gave their subjects representation in legislatures of the modern pattern. In a considerable number of principalities, estates of the mediæval type, with preponderant representation of the nobility, were established or reëstablished. In the majority of the German States, including Austria and Prussia, no constitutions were granted.

The political history of Germany from 1815 to 1866 is a record of popular revolutions incited by the example of France, with intervening periods of princely reaction. In 1830 and the following years several more German States obtained representative constitutions, but no step was taken toward the solution of the German question. In 1848 the German people made a vigorous effort to solve both questions, that of liberty and that of unity. Thoroughly intimidated by the apparent strength of the movement the princes gave way. In all the States with modern constitutions liberal reforms were introduced or promised; in all the other States constitutions were granted; and with the sanction of the Federal Diet, a constituent Parliament, elected by manhood suffrage and secret ballot, met at Frankfort, set up a provisional government, and proceeded to frame a constitution establishing a German empire. Against its own will this Parliament was constrained by the logic of the situation to accept the scheme originally supported by a minority — to exclude Austria from the proposed empire, and to offer the imperial crown to the King of Prussia. With the refusal of the crown by the elected emperor, the movement failed. The attempt made by Prussia in 1849 to establish, by compact between the princes, a somewhat similar but less centralized union also came to nothing. The princes agreed, at first, because Austria was struggling for its existence against national revolutions in Italy and Hungary, and could not defend its German clients against Prussia. In 1850 when Austria with Russia's

help had fought itself out of its difficulties, Prussia was obliged to submit to the Austrian demands and the German confederation was reëstablished.

During these decades the only really important achievement in the direction of German unity was the establishment and gradual extension, under Prussian control and guidance, of a German customs union. In 1818 Prussia broke down all customs lines between its various provinces, abolished all city octrois, and established for the whole kingdom a uniform tariff on imports. At the same time it invited its neighbors to come within its customs lines, and, by imposing heavy transit duties on their merchandise, made it difficult for them to remain outside. During the next 10 years but three States accepted the Prussian invitation. The rest endeavored to escape union with Prussia by forming independent South German and Central German customs unions. Resistance, however, was futile; and in 1834 the German Customs Union was formed, including by far the greater part of the German States. The Prussian statesmen comprehended from the outset, and the adversaries of Prussia soon realized, the political importance of this union. Austria, which had viewed its establishment with indifference, endeavored to frustrate its extension and finally demanded admission, but the demand was refused.

Education made great advances during this period. Not only were the German universities recognized as the first in the world, drawing an increasing number of students from other lands, but secondary education was broadened by the establishment of Latin-scientific schools, and the primary schools were greatly improved. Much, however, was left to be done by the next generation. In the province of Posen 41 per cent. of the recruits of 1854 had received no schooling at all.

Bismarck has left on record his conviction that if the narrower German unity under Prussia's leadership had been established in 1849, the wars with Austria and with France would have followed, instead of preceding, its establishment. Certainly the final and decisive reason why Prussia abandoned the undertaking in 1850 was the weakness of its army. The principle of universal military service had not been abandoned, but the standing army had not been kept sufficiently large to train all the able-bodied young men. When William I. assumed the regency (1858), less than two-thirds of those owing military service actually passed through the standing army; the rest were put, without adequate training, into the territorial militia (*Landwehr*). William proposed to increase the annual levy from 40,000 to 63,000, to lengthen the term of service in the first reserve, and to excuse the landwehr from the first call in case of mobilization. The deputies refused the necessary appropriations, but with Bismarck as his prime minister the king executed his plan in defiance of the will of the majority of his people. For four years the government was carried on without a legal budget. During this period, Schleswig and Holstein were wrested from Denmark, but the Prussian people remained firm in their opposition. Throughout Germany the attitude of the Prussian government so alienated Liberal sympathies that the establishment of national unity by revolution from below, on the lines of the movement of 1848, became impossible. Nothing was left but revolution from above, and this Bismarck carried through in 1866. In alliance with Italy, Prussia defeated the armies of Austria and of the principal German States. The hostile temper of the majority of the South German people and the opposition of Napoleon restricted German unity for the moment to the line of the Main. In North Germany, however, a strong federal union was established. Prussia annexed Schleswig-Holstein, Hanover, Electoral Hesse, Nassau, and Frankfort, and formed with the remaining States the North German Confederation. The constitution of this confederation was submitted to and amended by a German constituent Parliament, chosen according to the election law drafted by the Parliament of 1848. The sovereignty of the new federal State was vested in the allied princes and cities, represented in a Federal Council. The more important executive powers were intrusted to the King of Prussia as federal president. The legislative power was placed in the Federal Council and an Imperial Diet elected by manhood suffrage and by secret ballot. This substantial realization of the program of 1848 effected a great change in public opinion and for a dozen years Bismark had a working Conservative and Liberal majority in the Prussian and Imperial Diets.

The war with France in 1870–1871 brought the South German kingdoms into the national union on practically the same footing as the other States. This enlarged union now took the name of empire, and King William assumed the title of German emperor. The peace with France increased the territory of the empire by the cession of Alsace and part of Lorraine.

Placed as it is in Central Europe, without natural boundaries to separate it from the surrounding nationalities, the German people has never possessed a well-rounded or perfectly defined ethnographic territory; and even if States could be built on purely theoretical lines it would be difficult to construct a Germany that should include all areas in which the German element predominates and exclude all others. In the new Germany, however, such a result is at

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least approximately attained. The empire includes more than four-fifths of the German-speaking inhabitants of Europe; and not more than one-sixteenth of its population inhabits areas in which anti-German feelings are dominant. The population of the territories included in the present empire, which in 1816 was less than 25,000,000, has risen in spite of heavy emigration to 56,000,000 and is increasing at the rate of more than 1 per cent. annually.

In consequence of the extinction of reigning lines, voluntary cessions of sovereignty, the Prussian annexations of 1866, and the exclusion of Austria and Luxemburg, the empire includes but 25 States — 4 kingdoms, 18 grand duchies, duchies and principalities, and 3 free cities. These States vary in size from Prussia, with over 34,000,000 inhabitants, to Schaumburg-Lippe, with about 43,000. In all the monarchic States except Mecklenburg there is now constitutional government of a modern type. Mecklenburg has a mediæval diet of great landholders and city magistrates. Of the free cities, Lübeck has a government of a restricted democratic type; Hamburg and Bremen have governments of a mixed type.

In the empire the federal principle is asserted and the rights of the smaller States are safeguarded by the distribution of votes in the Federal Council. Not only has Prussia, with three-fifths of the total population, no majority in the council, but it would be possible for a combination of small States, including less than one-fifth of the total population, to outvote Prussia and the remaining States. So long, however, as Prussia refrains from threatening the rights of the little States no such combination can be made, and the emperors and their chancellors have thus far worked in substantial harmony with the allied sovereigns and their representatives. They have found it more difficult to secure support for their measures among the representatives of the people; partly because German political parties are so numerous that none has ever possessed anything like an absolute majority in the Imperial Diet — a fact which forces the government to work with coalitions — and partly because certain parties are always in uncompromising opposition — a fact which restricts the range of possible combinations. Until Bismarck adopted a protectionist policy he was able to hold together a majority composed of Conservatives and moderate Liberals. Since that time he and his successors have had to make terms with the Centralists, who represent the interests of the Roman Catholic Church.

In spite of these difficulties the imperial government has been carried on without overmuch friction, and its chief aims have been realized. By the development of indirect taxation, the empire has been made financially independent of the single States, and the army has been enlarged, from time to time, to keep somewhat more than even pace with the growth of Germany's population. Its peace footing which in 1875 was 405,000, is now 600,000; and the military expenditures which in 1872 were not quite 292,000,000 marks, amounted in the budget of 1900 to nearly 666,000,000. The burden of military service, however, has been lessened since 1893 by reducing the normal period of service in the standing army to two years.

Imperial legislation has been productive of other things besides soldiers and taxes. In the period of the North German confederation and in the first years of the empire, it completed the work begun in the period of French supremacy. It swept away many remnants of mediævalism that lingered in out-of-the-way corners of Germany. It gave the laboring man the right of free migration and it liberated industry and trade from all remaining restrictions of the 18th century pattern. It also created a uniform system of State courts with an appeal to the Supreme Court of the empire at Leipsic; it placed the judiciary beyond the control of the administration and it has gradually unified, in a series of imperial codes, criminal and civil law and procedure. In the field of State legislation, the most important achievement of the period was the elaboration in 1872 of a general system of local self-government in Prussia. Of the measures adopted during the conflict with the Roman Catholic Church little remains except the secularization of the Prussian primary schools and the expulsion of the Jesuits from the empire. Education is nowhere neglected. The percentage of illiteracy among the army recruits in 1898 was less than half of 1 per cent. in the most backward district, East Prussia, and less than one-fourteenth of 1 per cent. in the empire. In Hanover among nearly 11,000 recruits there were no illiterates.

During the second half of the 19th century Germany's economic conditions have been as completely revolutionized as its political organization. The removal by legislation of artificial checks on industry and enterprise and the establishment in the Customs Union of free trade throughout the greater part of Germany, with a moderate degree of protection against the rest of the world, were followed by a rapid increase of manufactures and trade. Since 1870 there has been an even more rapid development of Germany's foreign commerce. In its total foreign trade, imports and exports, Germany has forged ahead of France and now holds the second place in Europe. Germany's success in the world market is due in large measure to the cooperation of German science with German industry, and to the establishment of tech-

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nical and commercial schools of a high type. The change which this industrial and commercial development has brought about in Germany itself is very striking. In 1882 the agricultural population of the empire exceeded the industrial by 3,000,000, in 1895 the industrial population exceeded the agricultural by 1,750,000. During the same period the number of persons living by trade and commerce increased by 1,500,000. Twenty years ago Bismarck declared that only by the development of its manufacturing interests could Germany give employment to its increasing numbers and stem the tide of emigration. At the close of the century it seemed as if this result had been attained. German emigration over the sea, which has amounted during the century to 6,000,000 — which in 1853 was 318,000, and in 1881 221,000 — has gradually decreased till in 1898 and in 1899 it was less than 24,000.

The development of the German merchant marine has been accompanied by the development of a German navy and — the flag following trade — the extension of German commerce has led to the inauguration of a colonial policy. A Prussian navy was started in 1844 with a single corvette. The revolutionary German government of 1848 built a fleet to fight the Danes, but in 1852 the Federal Diet ordered its dissolution and the ships were sold at auction. With the establishment of the present empire provision was again made for an imperial navy, and in 1880 this navy was reckoned the third strongest in the world. In 1897, however, Germany had fallen back to the sixth place. In the following year the emperor secured from Parliament authority for the building of a number of new vessels and during the year 1900 a still more extensive program of construction was sanctioned.

Germany's foreign empire was started in 1884 and 1885 by the proclamation of a protectorate in various unoccupied territories in Africa and in the Pacific Ocean where German merchants had established themselves. Bismarck declared that these dependencies were not regarded by the imperial government as fields for German colonization, but as markets for the output of German industry. In 1897 Germany seized the harbor and city of Kiao-chau and secured from the Chinese government a long lease of adjacent territory. It has since asserted a sphere of influence embracing the whole province of Shantung. In 1899 Germany purchased from Spain the Caroline, Pelew, and Ladrone Islands. In 1900, by arrangement with Great Britain and the United States, it established exclusive control over one of the Samoan group. Thus far the dependencies have not been remunerative. In the imperial budget for 1900 21,877,000 marks were appropriated for the administration of the African territories alone, and of this sum 16,214,000 marks were to be supplied by the taxpayers at home. Germany's exports to these territories in 1899 were valued at 15,108,000 marks.

Before the law all Germans are equal, but socially there are marked class distinctions which are not without influence in the matter of appointment to office. Nobles are still preferred to commoners in the army, in diplomacy, and, to a less extent, in other branches of governmental service. The middle class, the bourgeois, has made the greatest advance in the last 100 years. It holds nearly all the new wealth that is now accumulating with unprecedented rapidity. Little of this finds its way into the hands of the nobles, except by marriage.

While the condition of the peasants has improved the artisan class has suffered, as in other countries, from the development of the factory system. Wages have risen faster than the necessaries of life, and the cheapening of products has brought many things within the reach of the laborer which at the beginning of the century would have seemed unattainable luxuries. But his work is harder and more monotonous and employment is more uncertain. The evolution from status to contract has made him more independent, but it has destroyed the ties which formerly subsisted between master and man, binding them to each other in relations that were not exclusively economic, but also human. The discontent of this class has found expression in the Social Democratic party. From 1878 to 1890 a fruitless attempt was made to suppress this party by special laws. At the same time serious efforts were made to improve by legislation the positions of the workingmen — efforts which culminated in a remarkable scheme of State-assisted compulsory insurance against accident, disease, and old age. Whatever the ultimate results of these laws may be they have as yet done nothing to check the growth of the Social Democratic party, which has increased its representation from 2 in 1867 to 24 in 1884, and 57 in the present Diet, and which, at the election of 1898 cast 26 per cent. of the total vote. It appears, however, that as this party grows stronger it is becoming less uncompromisingly intolerant of the capitalistic régime, and more inclined to aid in bettering the position of its constituents, the workingmen, within the existing social order.

The transformation of the Social Democracy into a radical reform party ought to be accomplished more easily in Germany than in any other modern State, for the Hohenzollern traditions are socialistic, and no other State has traveled so far as Prussianized Germany along the road of practical State socialism. Germany's triumphs in the struggle for economic su-

premacy, like its victories in war, have been achieved by a high degree of organization. The system, however, which assigns to each individual his place and function in a vast mechanism secures effective coöperation at no little cost; it sacrifices in some measure personal self-reliance and individual initiative. In the contest for the trade of the world with which the 19th century closed, German socialism was fairly pitted against Anglo-American individualism. Financial crises such as that which overtook Germany in 1873 prove nothing, for these occur everywhere; but before the close of the 20th century the world may well expect new, if not conclusive evidence, regarding the relative superiority of the two systems.

MUNROE SMITH.

Germersheim (ger'mers-hīm), a town of the Bavarian Palatinate, on the left bank of the Rhine, 8 miles S. S. W. of Spires. It fell into the hands of the French in 1644, by whom it was restored to the elector Palatine at the peace of Westphalia; but was again taken by the French in 1674 and in 1688. The peace of Ryswick restored Gemersheim to the Palatinate. There is some trade in corn, hemp, flax, etc., and a fishery.

Germinal (zhār-mi-näl'), the 7th month of the first French republican calendar, March 21 — April 19.

Germination, in botany, the first act of growth which takes place in an embryo plant. It cannot occur without the presence of water, heat, and atmospheric air, or, at least, of oxygen. Popularly water obtains the credit of the whole process, and it is undoubtedly true that seeds rapidly absorb it with the effect of softening the tissue, enabling the parts to distend, as well as dissolving those of them which are soluble, so that they may be taken into the circulation as growth proceeds. But heat also is necessary, and atmospheric air, to furnish oxygen, which is most effective if one part of it be diluted with three of nitrogen. Prior to germination the seed had in its composition some carbon, apparently to preserve it; with this the oxygen unites, forming carbon dioxide, which is thrown off. Meanwhile the parts of the seed have softened and distended; the embryo has swelled and burst its envelopes, after which the radicle is sent down into the ground, deriving its nourishment at first, however, from the cotyledons; the plumule rises upward, and the process of growth and development is completely in progress.

Germ Theory of Disease, the theory that certain diseases are communicated from an infected person to an uninfected one by living organisms which gain access to the body of the afflicted person by the air or food, or drink, and which, growing and multiplying in the body they invade, produce the changes characteristic of the particular disease. The period during which the living particles of contagious matter retain their vitality, like the rate of their growth and multiplication, varies in different cases, but it is limited in all. Few, if any, resist the destructive influence of a temperature of 300° F., while most succumb at the temperature of 200° or even less, particularly if exposed for some time. Animal poisons generally are destroyed by boiling, and clothes, sheets, etc., infected, may be rendered pure by being exposed to a temperature of 300° F. These living organisms are grouped together as microbes or micro-organisms, and are divided into different classes. The micrococcus is a round form about the 32,000th of an inch in size, and multiplies by fission. The bacterium is rod-shaped, about the 10,000th of an inch long, with rounded ends; it also multiplies by fission. The bacillus is a third form also rod-shaped, and somewhat larger than the bacterium. They often form long chains or threads, and increase by division and by spore formation. Vibrio and spirillum are somewhat similar forms; and, like the others, increase with a rapidity beyond conception. The connection between these micro-organisms and the various forms of zymotic disease has been thoroughly established.

The only method of investigation that yields reliable results is to separate the organisms supposed to be the cause of the disease, and cultivate it outside of the body. Thus a drop of blood from a person suffering from a special disease, which contains the bacteria, or bacilli, etc., believed to be the producers of the disease, is placed in a flask containing a nourishing material, care having been taken to destroy all other organisms in the flask. The special microbe flourishes there, let us suppose. It is then cultivated in one flask after another through successive generations, only a single minute drop of the material in one flask being used to inoculate a succeeding one. In this way a pure cultivation is obtained, a cultivation, that is, containing the particular microbe and none other. If this is the true cause of the disease, then a drop of the solution containing it introduced into the body of an animal capable of the disease ought to produce it, and the particular organism introduced should be found multiplying in the blood and tissues of the infected animal. Such a demonstration has been given of the cause of a few diseases. Dr. Koch, of Berlin, published in 1876 a paper giving a full account of the life history of the bacillus organism which had been observed in animals dead of

splenic fever; and in 1877 the great French chemist, Pasteur, proceeded to investigate the subject, and his investigations conclusively support the germ theory of disease. In 1882, Dr. Koch, of Berlin, announced the discovery of a micro-organism in tuberculosis, a disease believed to be the chief, if not the only, cause of consumption of the lungs. These microbes are found not only in the lungs of persons who have died of tubercle, but also in the spit of tubercular and consumptive patients, and multiply also by spores. Thus it is that the spit of a consumptive patient, even after it has dried up, may be capable of imparting the disease, owing to spores being scattered in the air. After the epidemic of cholera in Egypt in 1883, which spread to France and Italy, investigations were undertaken by French, German, and British commissioners. Dr. Koch detected a peculiar bacillus shaped like a comma (,), in the intestines of persons who had died of cholera, in the discharges from cholera patients, etc. He believed that this bacillus was the active agent in the production of the disease; but other authorities were unable to accept Dr. Koch's view that the comma-bacillus was the cause of the disorder.

All investigation, however, seems to point to the fact that every infectious or contagious disease is due to some form of micro-organism, and that there is one particular organism for each particular disease. Each organism produces its own disease and none other; and the special disease cannot arise unless its germ has gained entrance to the body. The channels through which these germs obtain entrance are innumerable, but they have one origin and one only, and that is a preceding case of disease. The "germ theory" affords the hope and suggestion of a method of diminishing, if not of getting rid of, such diseases altogether, and to some extent also indicates the direction in which their cure is to be sought. If the particular microbe of each contagious disease were known, the condition of its life and activity understood, there is great probability that its multiplication in the living body could be arrested, and the disease thus cured. Even without such knowledge, however, the germ theory indicates that the means for arresting the spread of contagious diseases and diminishing their occurrence consist in preventing the spread of the germs from an existing case of disease.

Gerocomy, that branch of medicine which treats of the proper regimen for old people.

Gerok, Karl (gä′rōk), a German religious poet; born in Vaihingen, Würtemberg, Jan. 30, 1815. "Palm Leaves," his first ambitious effort, brought out in 1857, established his reputation; and in the ensuing years he put forth many collections of verse, mostly of a deeply religious and devotional character. They include: "In Lonely Ways," "Flowers and Stars," "Beneath the Evening Star," and the "Last Nosegay." His patriotic songs are widely known. He died in Stuttgart, Würtemberg, Jan. 14, 1890.

Gérôme, Léon (zhā-rōm′), a French painter; born in Vesoul, France, May 11, 1824; and in 1841 entered the studio of Paul Delaroche at Paris, at the same time attending the School of Fine Arts. In 1863 he was appointed Professor of Painting in the School of the Fine Arts. His first great picture, "The Age of Augustus and the Birth of Christ," was exhibited in 1855; and four years later his "Roman Gladiators in the Amphitheater" raised to the highest pitch his reputation as a colorist and painter of the human figure, a reputation that was still further enhanced by "Phryne Before Her Judges" (1861). In the same year he exhibited, among other pictures, "Socrates Searching for Alcibiades at the House of Aspasia," "The Two Augurs," and a portrait of "Rachel." "Louis XIV. and Molière," "The Prisoner," "Cleopatra and Cæsar," "The Death of Cæsar," "The Plague at Marseilles," "Death of St. Jerome," "Lioness Meeting a Jaguar," and "The Gray Cardinal" (1874), are among the best known of his subsequent works. He died Jan. 10, 1904.

Gerona (hā-rō′nä), a city and capital of the province of Gerona, Spain; 65 miles N. E. of Barcelona. It contains a beautiful Gothic cathedral of the 14th and 15th centuries. The inhabitants carry on the manufacture of paper, cork-cutting, spinning, and weaving. The fortifications are now of little value. The town was formerly a place of great strength, and has undergone several notable sieges, particularly in 1653, 1684, 1694, 1706, and 1809, on each occasion by the French. Pop. 15,407.

Gerontes (ge-ron′tēz), a number of magistrates of Sparta who, with the ephors and kings, had the supreme power in the State. They were not eligible for election before they had attained the age of 60 years. Their number is variously stated at 20 and 32.

Geropigia, or **Jerupigia,** a mixture used to give color and spurious strength to port wines. It is made of unfermented grape juice with brandy and sugar, and a coloring matter obtained from rhatany root or logwood.

Gerrish, Theodore, an American author; born in Houlton, Me., June 19, 1846; received an academic education; served during the Civil War in the 20th Maine regiment, and was wounded four times; later

became a Methodist Episcopal clergyman. His publications include "Reminiscences of the War," "The Blue and the Gray," "Life in the World's Wonderland," etc.

Gerry, Elbridge, an American statesman; born in Marblehead, Mass, July 17, 1744; was a member of the Continental Congress in 1776–1780 and 1783–1785; delegate to the Constitutional Convention in 1789; member of Congress from Massachusetts, in 1789–1793; commissioner to France in 1797-1798; governor of Massachusetts in 1810–1812; and Vice-President of the United States in 1813-1814. It was during his term as governor that an unsatisfactory redistricting of the State took place, in which he was supposed to have taken part, whence arose the term "gerrymander," now generally applied to the process of so arranging electoral districts as to give a majority of Congressmen, or State Legislators, as the case may be, to the party having the minority in the total popular vote of the State. He died in Washington, D. C., Nov. 23, 1814.

Gersdorffite, an isometric, pyritohedral, silver-white, steel-gray, or grayish-black mineral of metallic luster, its hardness 5.5, specific gravity 5.6 to 6.9. Composition: Arsenic, 45.5; sulphur, 19.4; nickel, 35.1= 100. The varieties are normal gersdorffite, Lowes gersdorffite, amoibite, plessite, and dobschanite. It is found in Sweden, the Hartz Mountains, and Styria.

Gers (zhar), a department in S. W. France, separated by Landes from the Bay of Biscay; area, 2,425 square miles; capital, Auch. There are parallel lines of hills in the S., separated by fan-shaped valleys which expand as they extend toward the plains in the N. The Gers and other principal rivers are tributaries of the Garonne and Adour. One-half of the surface is devoted to agriculture, and nearly a sixth to vineyards. Wine is produced in considerable quantity; a great part of it being converted into Armagnac brandy. Pop. (1901) 238,448.

Gerson, Jean Charlier de (zher-sôn), a French theologian; born in Gerson, France, Dec. 14, 1363. He studied at the University of Paris, and in 1395 became chancellor of the university. He is mainly remembered in connection with his efforts to bring about a cessation of the great schism which had divided the Church since 1378. This proceeding, however, was a failure. When the Council of Constance (1414–1418), in which Gerson took a leading part, proved unable to settle the differences existing in the Church, he at last gave up the struggle, and sought shelter for a time in Bavaria and Austria. In 1419 he returned to his native country, and spent the last 10 years of his life with his brother, the prior of a community of Celestine monks at Lyons, devoting himself to the composition of theological and other treatises. He died in Lyons, France, July 14, 1429.

Gerster, Etelka (gers'ter), a Hungarian singer; born in Kaschan, Hungary, June 16, 1857; was a pupil of Madame Marchesi in Vienna. She made her first appearance in Venice in 1876, as Gilda, in "Rigoletto"; married her director, Pietro Gardini in 1877; made successful tours of the United States in 1878, 1883, and 1887; opened a school for singing in Berlin in 1896; and joined the staff of the School of Musical Art, New York city, in 1905.

Gerstäcker, Frederick (ger'stek-er), a German author; born in Hamburg, Germany, May 10, 1816. He emigrated while an apprentice to New York. He traveled on foot through the United States and Canada, performing any work that was offered to him. About 1842 he returned to Germany and published his travels, which became very popular and were translated into several languages. In 1849–1852 he journeyed around the world, and in 1862 explored in South America. His principal novels are, "The Pirates of the Mississippi," "The Feathered Arrow," and "A Wife to Order." He died in Brunswick, Germany, May 31, 1872.

Gerstenberg, Heinrich Wilhelm von (gers'ten-berg), a German author; born in Tondern, Schleswig, Jan. 3, 1737. He studied law at Jena, and then entered the Danish army. He subsequently lived in Copenhagen. His literary career began with "Trifles," a collection of verse; "War Songs of the Danish Grenadiers," "Song of a Scandinavian Bard," "The Bride," and "Ariadne in Naxos," succeeded — important and in many respects splendid efforts of poetic genius. His "Letters on the Striking Things in Literature," and his tragedy of "Ugolino," have proved very popular. As a critic he paid special attention to Shakespeare and to the old dramatists of England. He died in Altona, Holstein, Nov. 1, 1823.

Gertrude, the name of three Roman Catholic saints: The first, abbess of Nivelle, 626–659; the second, an abbess of the order of St. Benedict, and author of "Revelations," died in 1034; the third, a daughter of St. Elizabeth of Hungary, died in 1297.

Gervas (*Stachytarpheta Jamaicensis*), a small verbenaceous shrub of the West Indies and tropical America. It is regarded as of high medicinal value, and was used by the Indian sorcerers as its ally the vervain was in Europe. It has also been introduced into Europe as Brazilian tea, and also frequently employed as an adulterant of tea proper.

Gervase of Canterbury, an English monk; born about 1150. He wrote a chronicle of the reigns of Stephen, Henry II., and Richard I., and a history of the archbishops of Canterbury down to Hubert Walter. These works are valuable especially as elucidating the contemporary relations between Church and State. He died in the early part of the 13th century.

Gervinus, Georg Gottfried (ger-fē′nös), a German historian; born in Darmstadt, Hesse, May 20, 1805. He studied at Heidelberg, was for some time a teacher, and qualified as a privat-docent. After a visit to Italy he published his "History of the Poetic National Literature of the Germans," 1835–1842. In 1835 he was appointed extraordinary professor at Heidelberg, and the following year ordinary Professor of History and Literature at Göttingen; but in 1837, being one of the seven professors who protested against King Ernst August's breach of the constitution, he was banished from Hanover. After another visit to Italy he returned to Heidelberg, where in 1844 he was appointed an honorary professor. He now began to take an active part in politics on the liberal side; became editor of the newly-founded "Deutsche Zeitung," and was returned to the federal diet by the Hanse towns. Discontented with the tendency of affairs after 1848, he gave up politics and resumed his old studies. In 1849 he published the first part of his great work on Shakespeare, in 1853 his "History of German Poetry," and in 1855 the first volume of his "History of the Nineteenth Century," which, however, was never carried farther than the French revolution of 1830. Among his last writings was a critical essay on Handel and Shakespeare. He died in Heidelberg, Baden, March 18, 1871.

Geryon (jē′ri-on), in Greek mythology, a son of Chrysaor and Callirrhoe, King of Erythia, or of the Balearic Islands. The poets represent him as a giant with three bodies and three heads, who had large herds of cattle which he fed on human flesh. To guard them, he had a two-headed dog and a seven-headed dragon. Hercules slew him and his adherents, and carried away all of his herds to offer them to Eurystheus.

Gesenius, Friedrich Heinrich Wilhelm (gā-zā′nē-ös), a German Orientalist; born in Nordhausen, Saxony, Feb. 3, 1786; studied at Helmstedt and Göttingen and at Halle in 1810 became extraordinary, in 1811 ordinary, Professor of Theology. Here he lectured for more than 30 years, broken only by the closing of the university during the war of liberation (1813–1814), and by lengthened visits to France and England in 1820, to England and Holland in 1835. His first great work was his "Hebrew and Chaldean Hand Dictionary." His "Elementary Hebrew," consisting of the "Hebrew Grammar," and the "Hebrew Reader," has contributed enormously to the knowledge of the Hebrew language, not only in Germany, but through translations also in England and the United States. Later works are his "Critical History of the Hebrew Language and Literature" (1815), "On the Origin, Genius and Authority of the Samaritan Pentateuch" (1815), "A Critical Grammatical System of the Hebrew Language" (1817), and a new translation of and commentary on Isaiah (1820–1821). His greatest work is the monumental "The Critical Grammatical System of the Hebrew brew and Chaldean Languages in the Old Testament," of which the first part was published in 1829, but which was completed only in 1858 by Professor Rödiger. He died in Halle, Saxony, Oct. 23, 1842.

Gesner, Abraham, a Canadian geologist; born in Cornwallis, N. S., May 2, 1797; studied medicine in London, and returned to Nova Scotia. Later he became interested in scientific researches. In 1838 he was appointed to examine and report on the geological resources of the lower provinces of British North America. Afterward he discovered how to produce oil suitable for lamps from bituminous shale and cannel coal. He thus originated the discovery of "kerosene" (which name he gave his oil) in the United States. His publications include "Remarks on the Geology and Mineralogy of Nova Scotia" (1837); "Reports on the Geological Survey of the Province of New Brunswick" (1844); "New Brunswick, with Notes for Emigrants" (1847); "Industrial Resources of Nova Scotia" (1848); "A Practical Treatise on Coal Petroleum and Other Distilled Oils" (1861); etc. He died in Halifax, N. S., April 19, 1864.

Gesner, Konrad von (ges′ner), a Swiss naturalist; born in Zurich, Switzerland, March 26, 1516. All his life long he was passionately devoted to the pursuit of knowledge, especially knowledge of the natural sciences. His early studies, in medicine, natural history, and Greek and Latin literature, were prosecuted at Zurich, Strasburg, Bourges, and Paris. Returning home in 1535, he earned his living by teaching, till in 1537 he was appointed Professor of Greek at Lausanne. This chair, however, he exchanged four years later for that of physics and natural history at Zurich, where he taught and practised as a physician. He was also an indefatigable writer of books, and in the course of his life published no less than 72 works, besides leaving at his death 18 others in progress. His "Universal Library" (1545), contained the titles of all the books then known in He-

brew, Greek, and Latin, unpublished as well as published, with criticisms and summaries of each. His next undertaking, by far the greatest of his literary works, was the "Animal History" (1551–1558). The first book treats of viviparous quadrupeds, the second of oviparous animals, the third of birds, and the fourth of fishes and aquatic animals. He collected more than 500 plants undescribed by the ancients, and appears to have been the first who made the great step toward a scientific classification of distinguishing genera by the fructification. He also wrote on other branches of science, as medicine and mineralogy, and composed a great number of works dealing with the ancient classics, the "Mithridates sive de Differentia Linguarum" (1555) being the most notable. He died in Zurich, Switzerland, Dec. 13, 1565.

Gesneraceæ (-ā′se-ē), in botany, gesnerworts, an order of perigynous exogens, alliance bignoniales. It consists of soft-wooded herbs or shrubs, sometimes climbing or creeping, and often springing from scaly tubers. Leaves opposite or whorled, without stipules. Flowers showy, in racemes or panicles, rarely solitary; scarlet, violet, or white. Calyx half adherent, five-parted. Corolla monopetalous, tubular, irregular, five-lobed; stamens two or four, in the latter case didynamous; ovary half superior, one-celled, with two parietal placentæ placed right and left of the axis; seeds many. Fruit capsular or succulent. It is divided into two sub-orders or tribes: *Gesnereæ*, confined to the warmer parts of this country, and *Crytandreæ* more widely distributed.

Gesta Romanorum (jes′tä rō-ma-nō′-rum), "Deeds of the Romans," title of a collection of short tales, legends, etc., in Latin, very popular in the Middle Ages. The book was probably written about the close of the 13th century by a certain monk Elinandus, an Englishman or a German. The separate tales making up the Gesta are of very various contents, and belong to different times and countries, the sources from which they are derived being partly classical, partly Oriental and partly western. Whatever may have been the intention of the original compiler, they very soon were adapted to the moralizing tendencies of the time, and moral reflections and allegorical interpretations were added to them, it is said, by a Petrus Bercorius or Pierre Bercaire of Poitou, a Benedictine prior. After the Reformation the book fell into oblivion.

Gessler, Albrecht, or **Herman** (ges′-ler), called also GESSLER VON BRUNECK (in Swiss legendry), was in 1300 appointed joint-governor along with Berenger von Landenberg, of the Waldstädten or forest cantons (Schwytz, Unterwalden, and Uri), by Albrecht I. of Austria. According to the traditions connected with WILLIAM TELL (*q. v.*), his oppressive edicts and wanton cruelty so enraged the inhabitants that a conspiracy was formed against him, and he was shot by Tell in a narrow pass near Küssnacht in 1307.

Gestation, in physiology, the act of carrying young in the uterus from the time of conception to that of parturition. The average time of a woman's pregnancy is 9 solar months, or about 280 days, though it may be as few as 7 or as many as 10. The period of gestation is shorter in carnivorous than in herbivorous animals. The young of the former are also less developed at birth, their eyes not opening for several days thereafter. Herbivorous animals: The elephant has 20 or 21 months' gestation; the giraffe, 14 months; dromedary, 12 months; buffalo, 12 months; ass, 12 months; mare, upwards of 11 months; rhinoceros, 9 months; cow, 9 months; many of the larger deer, over 8 months; sheep and goat, 5 months; pig, 4 months. Rodents: Beaver, 4 months; dormouse, 31 days; rabbit, 30 to 31 days; squirrel and rat, 28 days; guinea-pig, 21 days or less. Carnivorous: Bear, 6 months; lion, 108 days; puma, 79 days; fox, wolf, and dog, 62–63 days; cat, 55 or 56 days. Pouched animals: Kangaroo, 39 days; opossum, 26 days. Cetaceous animals: Greenland whale, about 10 months. The most common duration for the varieties of monkeys is 7 months. Oviparous animals: The goose sits 30 days; swan, 42 days; hens, 21 days; ducks, 30 days; pea-hens and turkeys, 28 days; canaries, 14 days; pigeons, 21 days; parrots, 40 days. The periods are subject to considerable variation, especially in domestic animals, and various conditions modify the period, of which the above are only the averages.

Geszner, Salomon (ges′ner), a Swiss poet and painter; born in Zürich, Switzerland, April 1, 1730. Painting and etching were his earliest pursuits, and he distinguished himself in both; but his friendship with Wieland and Kleist turned him toward literature. His first success as a poet was in the "Song of the Swiss to His Armed Sweetheart," in 1751. "Daphnis" and a volume of "Idylls" spread his fame widely, and the "Death of Abel" had great vogue in its day. He affected a mock-heroic style that is now distasteful. He died in Zürich, Switzerland, March 2, 1788.

Geta (jē′tä), **Septimus,** second son of the Emperor Severus; born A. D. 189, and was brother of the infamous Caracalla, with whom he was associated in the empire on the death of his father. Caracalla, who envied his virtues and was jealous of his popularity, after having endeavored to ef-

fect his death by poison, murdered him, and wounded their mother, who was attempting to save him, A. D. 211.

Getæ (jē′tē), a people of Thracian extraction, first mentioned as dwelling on the right bank of the Danube, but in the middle of the 4th century B. C. they crossed that river and settled in Transylvania and Wallachia. They were conquered by Darius Hystaspes in 515 B. C., and then accompanied him in his campaign against the Scythians. Both Alexander the Great, in 335, and Lysimachus, in 292, made unsuccessful attempts to subdue them. The Getæ, as distinct from the Dacians, sided with Octavius against Antony, and during the greater part of the 1st century after Christ continued to harass the Roman legions. In A. D. 106 the Dacians and Getæ were subdued by Trajan, their country being added to the empire. Subsequently the Getæ became fused with the Goths, who invaded their lands, and afterward carried many of them with them in their W. migrations. See JATS.

Gethsemane (geth-sem′a-nē), an olive garden or orchard near Jerusalem, memorable as the scene of the last sufferings of our Lord. The traditionary site of this garden places it on the E. side of the city, a very little beyond the Kedron, near the base of Mt. Olivet. It contains some very old olive trees, piously regarded as having stood there in the time of our Lord.

Gettysburg, Battle of, a battle fought July 1–3, 1863, between the Union army under General Meade, and the Confederates under General Lee. During May the armies lay fronting each other upon the Rappahannock. Early in June Lee began his movement for the invasion of Pennsylvania, crossing the Potomac on the 24th and 25th, and reaching Chambersburg, Pa., on the 27th. General Hooker, then in command of the Army of the Potomac, moved in the same general direction, but on the 28th was relieved, and the command given to Meade. In order to prevent his communications from being severed, Lee turned back toward Gettysburg to give battle. Meade had intended to give battle at a spot several miles from Gettysburg, near which was, however, a small portion of his army. This came into collision a little before noon, July 1, with the advance of Lee, and was forced back, taking up a strong position on Cemetery Hill, in the rear of Gettysburg. Hancock, who had been sent forward to examine the position, reported that Gettysburg was the place at which to receive the Confederate attack, and Meade hurried his whole force to that point. The action on the second day, July 2, began about noon with an attempt made by Lee to seize Round Top, a rocky hill from which the Union position could be enfiladed. When this day's fighting closed Lee was convinced that he had greatly the advantage, and he resolved to press it the next day. On the morning of July 3 an attempt was made upon the extreme Union right, but repelled. The main attack on the center was preluded by a cannonade from 150 guns, which was replied to by 80, little injury being inflicted by either side. About noon the Union fire was slackened in order to cool the guns, and Lee, thinking that the batteries were silenced, launched a column of 15,000 or 18,000 against the Union lines. Some of this column actually surmounted the low works, and a brief hand-to-hand fight ensued. But the column was practically annihilated, only a small portion escaping death or capture. The forces on each side were probably about 80,000, though all were not really engaged. No official report of the Confederate loss was ever published; the best estimates put it at about 18,000 killed and wounded, and 13,600 missing, most of them prisoners. The Union loss was 23,187, 16,543 of whom were killed and wounded. Pop. borough (1910) 4,030.

Geum (jē′um), a genus of *Rosaceæ*, suborder *Potentilleæ*, distinguished from *Potentilla* by the hardened hooked styles which crown the carpels, so that the fruit becomes a burr. Two species are common natives of Great Britain, *G. urbanum*, the wood avens or herb bennet, and *G. rivale*, water avens, the former with erect yellow flowers, and the latter with nodding flowers of a brownish hue. The former grows in hedges and thickets, the latter in wet meadows and woods, and sometimes even in very alpine situations. The so-called *G. intermedium* is usually regarded as a mere hybrid of these two species. Both are aromatic, tonic, and astringent; the root-stock of the former was formerly gathered in early spring to impart its clove-like flavor to ale, and is still used in the preparation of liquors. *G. canadense*, the chocolate root or blood root of North America, has some reputation as a mild tonic.

Gevaert, François Auguste (ge-var′), a French composer; born in Huysse, near Oudenarde, France, July 30, 1828. He composed several successful operas, and was inspector of music at the Academy of Music, Paris, from 1867 to 1870. Since that time he has devoted himself to the history of music. His publications include: "History and Theory of Music in Antiquity"; "Treatise on Instrumentation"; "The Origin of the Liturgic Chant in the Latin Church" (1890).

Geyser (gī′zer) (Icelandic *geysa* = to gush), in geology, an intermittent hot spring, the most notable specimens being

those in the Yellowstone region of the Rocky Mountains and those of the S. W. division of Iceland, about 30 miles from Mount Hecla. Nearly 100 of the latter are said to break out within a circle of 2 miles.

GEYSER.

Few of them play longer than five or six minutes at a time, though sometimes they go on for half an hour. The largest is called the Great Geyser. It has a pipe 78 feet in vertical depth, and from 8 to 10 feet in diameter, but gradually widening as it rises into the basin. The latter is 56 feet long by 46 feet broad, and is lined with an incrustation of silica deposited from the hot water, the process being aided by the alkali soda, which, with minute quantities of various salts, exists in the water. When the geyser is about to act, subterranean noises are heard like the distant firing of cannon, and the earth is slightly shaken; then a column of the liquid element is thrown up to the height of 100 or 200 feet. Steam after a time makes its way out of the rent, and the fountain ceases to play. The second in size is the Strokkur. If stones or turf be thrown down its pipe, an eruption will follow in a few minutes, and eject them with great force. Geyser action is produced by the heating of the lower part of the geyser tube. There are also some remarkable geysers in New Zealand, in the Northern Island.

Geyserite, a variety of fiorite or siliceous sinter, which again is a variety of opal. It is applied to the concretionary deposits around the Icelandic geysers. The "British Museum Catalogue" makes geyserite simply a synonym for siliceous sinter.

Geyter, Julius de (chā'ter), a Flemish poet; born in Lede, Belgium, May 25, 1830. He was in early life a school-teacher and later a law-court official, but for many years he has been connected with a bank in Antwerp. His best-known work is the epic "Emperor Charles." His songs, which deal with national heroic topics, and his cantatas, are exquisitely melodious and metrically perfect, and are favorites with his people.

Gfrörer, August Friedrich (gfre'rer), a German historian; born in Calw, in the Black Forest of Würtemberg, March 5, 1803. He studied theology at Tübingen, lived at Lausanne, Geneva, and Rome, becoming on his return in 1828 a Repetent at Tübingen, and in 1830 librarian at Stuttgart. He now gave himself with much zeal to historical studies, of which the first fruit was his "Philo and the Jewish Alexandrian Theosophy" (1831), followed by "Gustavus Adolphus" (1835), a work which aimed at bringing into prominence the political rather than the religious rôle of the great Swedish king. His "History of Early Christianity" (1838) was called forth by the greater work of Strauss. In his "Universal Church History" (1841–1846), coming down to 1305, he first spoke out his admiration for the polity of the Roman Church. Soon after he was called to the chair of history at Freiburg, and in 1848 he was sent to the Frankfort Parliament, where he was one of the most decided adherents of the party called the Gross-

deutschen, the fanatical opponents of Prussia. He formally went over to Rome in 1853, and thereafter was distinguished by his large share of the intolerance of the convert, though all the while he was never a dogmatically satisfactory Catholic. His most important other works were "History of the Carlovingians" (1848) and "Pope Gregory VII." (1859–1861). All his works are learned, often perversely so; his conclusions are too often more ingenious than sound. He died in Carlsbad, Bohemia, July 6, 1861.

Ghaisne, Louis Auguste Victor de. See BOURMONT, COMTE DE.

Ghara (ghä′rä), in India, a name sometimes given to the united stream formed by the junction of the Sutlei and the Beas, from Endrisa to the junction with the Chenab, when it becomes known as the Panjnab. The distance between the two points of confluence is about 300 miles.

Ghasel, or **Ghazel,** a form of lyrical poetry among the Turks and Persians, which may be either erotic and bacchanalian, or allegorical and mystical.

Ghâts, or **Ghauts** (gâts), **Eastern** and **Western,** two converging ranges of mountains, which run parallel with the E. and W. coasts of Southern India, and meet at Cape Camorin, enclosing the ocean. The Ghâts commence in the vicinity of Balasor, a little N. of the Mahanadi, and run through Madras, with an average height of 1,500 feet, for the most part at a distance of from 50 to 150 miles from the coast. They are nowhere a watershed on any considerable scale, being penetrated and crossed by nearly all the drainage of the interior. The Western Ghâts stretch from the valley of the Tapti, in about the same latitude as Balasor, to their junction with the kindred ridge, and on to Cape Comorin itself. Though they are generally far more continuous and distinct than the Eastern Ghâts, yet they are sharply divided by the gap of Palghât — the N. section measuring 800 miles in length, and the S. 200. Their general elevation varies from about 3,000 feet to upward of 7,000; the peak of Dodabetta, in the Nilgiri hills, is 8,760 feet above sea-level.

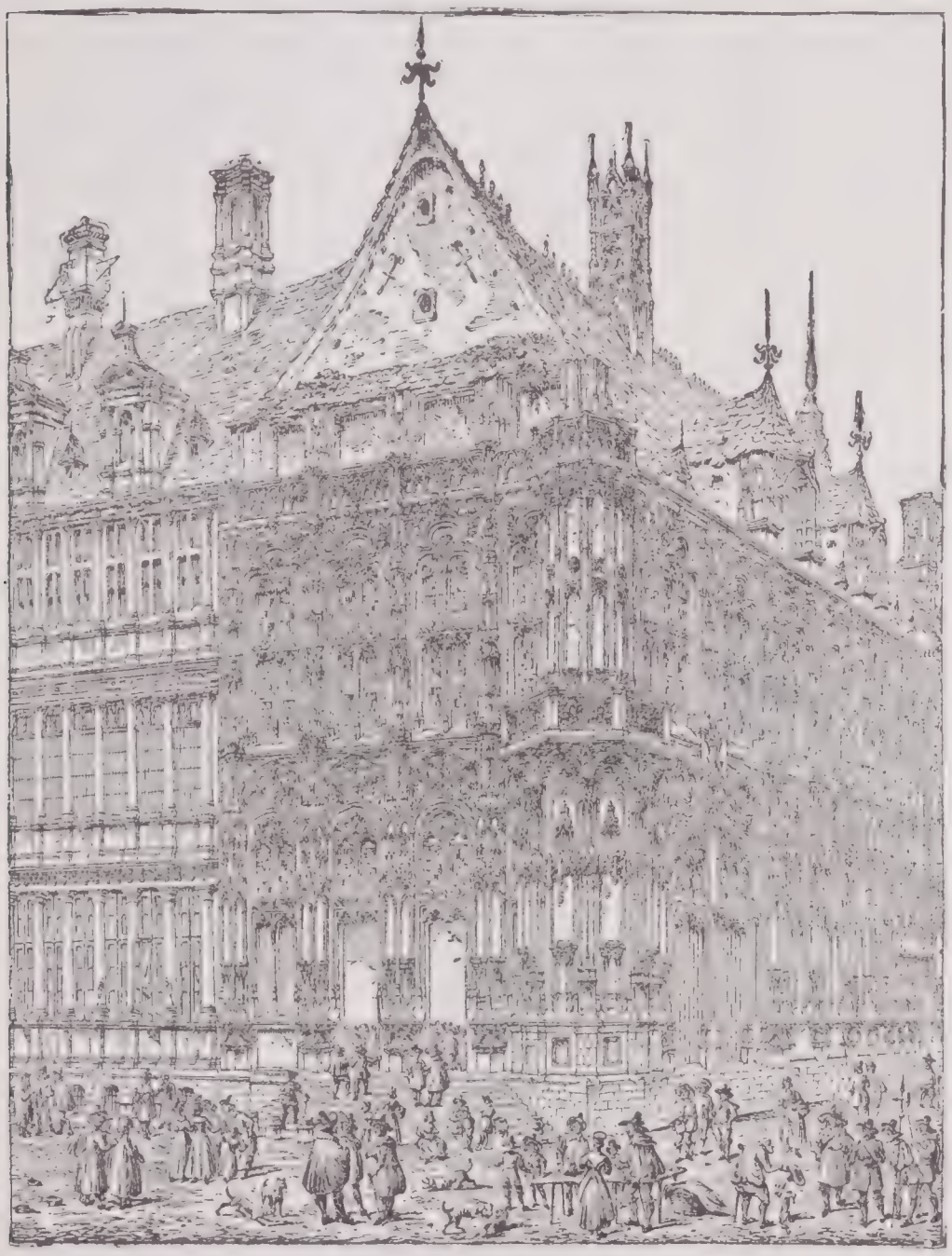
The name Ghâts is also applied to the flights of steps, whether intended as landing places or as bathing stairs, which line the river banks in towns and places of pilgrimage in Northern and Central India. Most great rivers, and especially the Ganges, possess many ghâts; but they are also built on the margins of lakes, as at Pushkar and Sagar, or even of tanks. The uniformity of the long lines of steps is often broken by shrines or temples, built either close to the water's edge or at the top; and on these steps are concentrated the pastimes of the idler, the duties of the devout, and much of the necessary intercourse of business. The ghâts of Benares, Harwar, Panharpur, and of Maheswar, on the Nerbudda, are noteworthy either for their number or beauty; while Cawnpur, Sadullapur, the ruined city of Gaur, and other places possess noted "burning ghâts" for purposes of cremation.

Ghazipur (gä-zē-pör′), a city, capital of the district of Ghazipur, India, on the left bank of the Ganges, 44 miles N. E. of Benares. The city, which stretches along the Ganges for about 2 miles, contains the ruins of the Palace of Forty Pillars, and a marble statue by Flaxman to Lord Cornwallis, who died here in 1805. Ghazipur is the headquarters of the Government Opium Department for the United Provinces, all the opium from these provinces being manufactured here, and there is trade in sugar and tobacco. Pop. (1901), district, 913,818; city, 39,429.

Ghazni (gäz′nē or guz′nē), a town of Afghanistan, below a spur of a range of hills, at an elevation of 7,729 feet, 84 miles S. W. of Kabul, on the road to Kandahar and at the head of the Gomal route to India. It is a place of considerable commercial importance. The climate is cold, snow often lying for three months in the year. Nevertheless, wheat, barley, and madder are grown in the vicinity. From the 10th to the 12th century Ghazni was the capital of the empire of the Ghaznevids (see below); it then fell into the hands of the Sultan of Ghûr; and afterward captured by the Mongols. It remained subject to the Mongol rulers of Delhi and Agra till 1738, when it was taken by Nadir Shah of Persia, and at his death was incorporated in the kingdom of Afghanistan. During the 19th century it figured in the British wars against the Afghans, having been stormed by Lord Keane in 1839, and again in 1842 by the Afghans, but retaken the same year by General Nutt. In the neighborhood of Ghazni there are several ruins and monuments of its former greatness, such as the tomb of Mahmud, Mahmud's dam in the Ghazni river, and many Mohammedan shrines. The celebrated gates of Somnath were kept at Ghazni from 1024 to 1842. Pop. (1890) 10,000.

Ghaznevid Dynasty.— About the middle of the 10th century a lieutenant of the Samanid ruler of Bokhara seized on Ghazni, and, dying in 977, left it to his son-in-law, Sebuktagin, who during a reign of 20 years extended his sway over all modern Afghanistan and the Punjab. But it was under his son Mahmud (997–1030) that the Ghaznevids reached their highest point of splendor and renown. This prince repeat-

edly invaded India, and carried his conquering arms as far as Kurdistan and the Caspian on the W. and to Samarkand on the N. He was the first monarch in Asia to assume the title of sultan. His descendants had a keen struggle to maintain themselves against the Seljuks, who had seized on Khorasan, Balkh, Kharezm, and Irak during the reign of Mahmud's son Masaud (1030–1042), and against their jealous rivals the princes of GHÛR (*q. v.*). Bahram Shah, ruler of Ghazni from 1118 to 1152, was at length driven from his capital by the latter, and retired to the Punjab. There his grandson, Khosrau Malek, the last of the dynasty, made Lahore his capital. This town was, however, taken by the Prince of Ghûr in 1186, and with this the Ghaznevid dynasty came to an end.



CITY HALL IN GHENT.

Ghee, or **Ghi** (gē), a kind of butter in use among the Hindus; made from the milk of the buffalo or the cow. The milk is boiled for an hour or so, and cooled, after which a little curdled milk is added. Next morning the curdled mass is churned for half an hour; some hot water is then added, and the churning continued for another half hour, when the butter forms. When, after a few days, it becomes rancid, it is boiled till all the water is expelled, and a little more curdled milk added, with some salt or betel leaves, after which it is put into pots. It is a favorite article of consumption among rich Hindus.

Gheel (gāl), a colony for the insane, in Belgium, 26 miles E. S. E. of Antwerp, in a comparatively fertile spot, in the midst of an extensive sandy waste, called the Campine. Here in A. D. 600 St. Dymphna, an Irish princess, is said to have been beheaded by her father for resistance to his incestuous passion. Pilgrims, the sick, the sorrowful, and the insane, visited the shrine of the Christian virgin; the last were restored to sanity and serenity. About 1,300 insane persons are lodged with the citizens of this community, and are controlled and employed by them, and this without recourse to walls or other asylum appliances, and with little coercion of any kind. The quieter sufferers reside generally one in each family in the village, the more excited in separate farmhouses at some distance on the confines of the commune, while those requiring medical treatment are temporarily accommodated in the infirmary in Gheel. The support of the patients is in most cases guaranteed by the State. Pop. (1900) 13,070.

Ghent (French, Gand; Flemish, Gend or Gent), a town in Belgium, capital of the province of East Flanders, at the confluence of the Lys with the Scheldt. It is upward of 6 miles in circumference, and is divided by canals into a number of islands connected with each other by bridges. Except in some of the older parts, it is well built, and has a number of fine promenades and many notable buildings. Among the latter are the cathedral of St. Bavon, dating from the 13th century; the church of St. Nicholas, the oldest in Ghent; the church of St. Michael, with a celebrated Crucifixion by Vandyk; the university, a

handsome modern structure, with a library of about 100,000 volumes and 700 manuscripts; the City Hall, the belfry, a lofty square tower surmounted by a gilded dragon, and containing chimes of 44 bells; the new Court House; the Marché du Vendredi, an extensive square, interesting as the scene of many important historical events; and Les Béguinages, extensive nunneries founded in the 13th century, the principal occupation of whose members is lace-making. Ghent has long been celebrated as a manufacturing town, especially for its cotton and linen goods and lace. Other industries of importance are sugar-refining, hosiery, thread, ribbons, instruments in steel, carriages, paper, hats, delftware, and tobacco. There are also machine works, engine factories, roperies, tanneries, breweries, and distilleries. The trade is very important. A canal connects it with the Scheldt at Terneuzen. Another canal connects the Lys with the canal from Bruges to Ostend. Ghent was mentioned as a town in the 7th century. In the 9th century Baldwin, the first Count of Flanders, built a fortress here against the Normans. Under the counts of Flanders Ghent continued to increase. Two great revolts took place under the leadership of the Van Arteveldes (1338 and 1369) against Burgundy, and again in the 16th century against Charles V., and the citizens of Ghent, besides losing their privileges, had to pay for the erection of a citadel intended to keep them in bondage. In 1792 the Netherlands fell under the power of France, and Ghent became the capital of the department of Escaut (Scheldt). In 1814 it became, along with Flanders, part of the Netherlands, till the separation of Belgium and Holland. Pop. (1909) 163,763.

Ghent, Treaty of, a treaty between the United States and Great Britain, concluded at Ghent, Dec. 24, 1814, which terminated the War of 1812.

Gherardesca (gā-rär-des'kä), a family of Tuscan origin which plays an important part in the history of the Italian republics of the Middle Ages. Historically the most prominent member of the family is Ugolino, whose death, and that of his two sons and grandsons, by starvation in the "Tower of Hunger," is described in one of the celebrated passages of Dante's "Divine Comedy." Ugolino had made himself master of Pisa, and had behaved in the most cruel and arbitrary manner for four years, when, in 1288, he was overthrown by a conspiracy.

Gherardi, Bancroft (-rär'dē), an American naval officer; born in Jackson, La., Nov. 10, 1832; he entered the navy as midshipman from Massachusetts in 1846, and was at the Naval Academy in 1852. He was lieutenant on the "Lancaster," of the Pacific squadron, at the commencement of the Civil War, and in 1862 was made lieutenant-commander. During the war he commanded the "Chocorua," and "Port Royal," being on the latter vessel in the battle of Mobile Bay, in which he was distinguished for bravery and gallantry. He became commander in 1866; captain in 1874; commodore in 1884; and rear-admiral in 1887; he was commandant of the Brooklyn navy yard in 1886; commanded the North Atlantic Squadron; and directed the Columbian naval review in New York harbor in 1893. Retired in 1894; died Dec. 10, 1903.

Gherardi del Testa, Tommaso (gā-rär'dē del tes'tä), an Italian comedy-writer; born in Terriciuola, near Pisa Italy, 1815. After studying at Pisa he settled as a lawyer in Florence; but in 1848 he enlisted for the war with Austria and was taken prisoner. He had already written "The Son of an Illegitimate," a novel; but he now turned his attention entirely to comedy, and rose rapidly to prominence through the inimitable drollery of his dialogue and the originality of his situations. "George's System, "Men Must Not be Trifled With," and "The Reign of Adelaide," are conspicuous among his many productions. Of a less mirthful but more satirical nature are "The Fashion and the Family," "New Life," "The False Letters," and other efforts of his maturer years. He died near Pistoja, Italy, Oct. 13, 1881.

Gheriah (ger'i-ä), a town of British India. It was the principal port of Augria, a famous piratical prince, whose fort was taken and his whole fleet destroyed by the English and Mahrattas in 1756.

Ghetto, the Jewish quarter in Italian cities, to which they were formerly confined. The ghetto of Rome, instituted in 1556 by Pope Paul IV., was removed in 1885, its demolition having been rendered necessary by the new Tiber embankment. The term is also employed to indicate the Jews' quarters in any city.

Ghi. See GHEE.

Ghibellines (gib'e-linz), a political party of the 12th to the 15th centuries. On the death of Lothaire II., Emperor of Germany, Dec. 4, 1137, Conrad, Duke of Franconia and Lord of Weiblingen (which by corruption became Ghibelline), was elected his successor. His right to the imperial throne was, however, disputed by Henry the Proud, Duke of Saxony and Bavaria, who was in consequence declared an outlaw and shortly afterward died. His adherents transferred their allegiance to his son, Henry the Lion, at that time a boy of 10 years old, and the whole empire was divided into the partisans of Conrad, who assumed the name of Ghibellines, and those of Henry, or the Guelphs. These titles were

first used at the battle of Weinsberg in 1140. The strife between the two parties subsided in Germany, but continued in Italy, resulting in war in 1159. The supporters of the Popes were termed Guelphs and those of the emperors Ghibellines. Charles of Anjou expelled the Ghibellines from Italy in 1268; but the contest between the two factions continued till the French invasion in 1495 united them against a common enemy.

Ghiberti, Lorenzo, an Italian sculptor; born in Florence about 1378. His ancestors had distinguished themselves in the arts, particularly in that of the goldsmith, in which the Florentines had acquired great celebrity. He early learned from his stepfather Bartoluccio, an expert goldsmith, the arts of drawing and modeling, and that of casting metals. He afterwards probably enjoyed the instructions of Starnina. Being obliged to leave Florence on account of the plague which prevailed there at the end of the 14th century, he was engaged in painting in fresco at Rimini, in the palace of Prince Pandolfo Malatesta, when the priori of the society of merchants in Florence invited artists to propose models for one of the bronze doors of the baptistry of San Giovanni. The offering up of Isaac was to be executed in gilt bronze, as a specimen of the work. The judges selected the works of Donatello and Ghiberti as the best (according to Vasari, also that of Brunelleschi, who is not mentioned by Ghiberti himself as one of the competitors); but the former voluntarily withdrew his claims, giving the preference to Ghiberti. After 21 years' labor Ghiberti completed the door and at the request of the priory executed a second after almost as long a period. Michael Angelo said of these, that they were worthy of adorning the entrance of paradise. During these 40 years Ghiberti also completed a statue of John the Baptist for the Church Or-San-Michele, two bas-reliefs for the baptistry of the Cathedral of Sienna, a statue of St. Matthew, and one of St. Stephen, likewise for the Church of Or-San-Michele, and for the Church Santa Maria del Fiore the bronze reliquary of St. Zenobius, Bishop of Florence. All these works are still preserved, and serve to show the progress of Ghiberti. The dryness of the school of Giotto appears in his early works; the later are in imitation of the Greeks, and are marked by continually increasing vigor and firmness. The reliquary of Zenobius and the two doors of the baptistry of San Giovanni are to this day among the finest specimens of art in modern Italy. Ghiberti also executed some excellent paintings on glass for the Churches Or-San-Michele and Santa Maria del Fiore. A work by him on sculpture is extant, a fragment only of which has been published by Cicognara. He died in Florence about 1455. The Kalmuck Feodor Ivanovich published 12 beautiful etchings of the doors of Ghiberti in 1798.

Ghika, Helena (gē'ka), Princess Koltzoff-Massalsky, a Rumanian author, better known by her literary pseudonym of DORA D'ISTRIA; born in Bucharest, Rumania, Jan. 22, 1829. The family from which she was descended was Albanian in origin, and from the time of George Ghika, hospodar of Wallachia in 1660, gave many princes and eminent men to the principalities (see RUMANIA). Profoundly instructed in the classics under the care of George Pappadopoulos, the princess added to her acquirements by travels through Germany, France, and Italy an extensive knowledge of modern languages and literature. At 15 she commenced a translation of the "Iliad" into German, and not long after wrote several pieces for the theater. On her unhappy marriage in 1849 with Prince Koltzoff-Massalsky she accompanied her husband to the court of St. Petersburg; but from 1855 she resided mainly at Florence, where she died, Nov. 22, 1888. Her first important work, "Monastery Life of the Eastern Church," was published in 1855. Other works were: "The Swiss Germany" (1856); "Womankind in the Orient" (1860); "Travels in Rumelia" (1863); "On the Shores of the Swiss Lakes" (1864); "Womankind by a Woman" (1864); "Turkish Poetry" (1873). She wrote much for the "Revue des Deux Mondes" and other journals and magazines of France, Italy, Belgium, and Switzerland; and her writings on Albanian literature stirred up a notable literary and national movement among the Albanians. She was made a member of several learned societies, and an honorary citizen of the Greek kingdom.

Ghilan, a province of Persia, on the S.W. shore of the Caspian Sea; bounded on the N. E. by the Caspian Sea, E. by the province of Mazanderan, S. by Irak Ajemi, N. by Russia, and W. by the province of Azerbaijan; length, 70 miles; average breadth, about 50 miles. A lofty range of mountains, measuring from 6,000 to 9,000 feet above the level of the sea, forms its inland boundary. The capital is Resht. The whole province, except where cleared for cultivation, and on the mountain summits, is covered with woods, and the excessive rain and dense vegetation render all of the level country a morass. The climate is consequently unhealthful, and in the hot months is fatal to Europeans. The province is rich in metals. The language of Ghilan proper is the Ghilaik, a dialect of the Persian. The inhabitants are represented as rude and brutal, much addicted to plunder and murder, and hardy, muscular, and active. Their food is very simple and light, consisting chiefly of rice and fish; but Ghilan has an

abundance of fine poultry, and wild fruit grows profusely everywhere. The vines climb up the forest trees, as in Turkey, and the juice of the grape affords a delicious kind of syrup, which is eaten with dry boiled rice. Wheat and barley are very sparsely cultivated. The oak and birch flourish in the province, but the former does not attain to any great size. In the woods lurk the tiger and panther, the wild boar and the jackal; birds are very numerous, and the reedy marshes and islands are homes of various species of fowl. Enzilli is the only seaport of Ghilan. Its harbor is deep enough to admit vessels of 250 tons burden, but the passage is much obstructed by sandbanks. A considerable quantity of raw silk is exported, the average production being about 10,000 bales. Pop. about 200,000.

Ghirlandajo (gēr-lan-da'yo), **Il.** Domenico Curradi, nicknamed Il Ghirlandajo ("the garland maker"), an Italian painter; born in Florence, Italy, in 1449. As a youth he was apprenticed to a goldsmith, and it was not until his 31st year that he became known as a painter. He painted principally frescoes, and in his native city. The Church of Ognisanti there contains from his hand, a "St. Jerome" and a "Last Supper" (1480); the Palazzo Vecchio, the "Apotheosis of St. Zenobius" (1481-1485); the church of St. Trinità, six subjects from the life of St. Francis (1485) and an altar-piece, the "Adoration of the Shepherds"; the choir of St. Maria Novella, a series illustrating the lives of the Virgin and the Baptist (1490). Between 1428 and 1484 he painted for Pope Sixtus IV., in the Sistine Chapel at Rome, the excellent fresco "Christ Calling Peter and Andrew," and at about the same time two pictures in the chapel of St. Fina at San Gimignano. Besides these he also executed some easel pictures of great merit, as "Adoration of the Magi" (1488), in the church of the Innocents at Florence; the "Visitation of the Virgin (1491), in the Louvre; the "Adoration of the Virgin by the Saints," in the Uffizi at Florence; and "Christ in Glory," at Volterra. He also executed mosaics, that of the "Annunciation" in the cathedral of Florence being especially celebrated. He died in Florence, Italy, Jan. 11, 1494.

Ghislanzoni (gēs-län-zō'nē), **Antonio,** an Italian dramatist; born in Lecco, Italy, in 1824. He first studied medicine, then became an opera-singer, finally entering political journalism. He tried his hand at many kinds of literary work, and was most successful as a writer of librettos, "Aïda" being probably the best. He produced "Book of Oddities," "A Forbidden Book," "Fashion in Art," and numerous similar volumes, all of a rather ephemeral nature. He died in Lecco, Italy, July 18, 1893.

Ghizeh, *Gizeh,* or *Geezeh,* a town of Middle Egypt, on the left bank of the Nile, here crossed by a railway bridge, almost directly opposite Cairo. It was formerly an important place, beautified by palaces, but now presents a scene of ruins, amidst which the town is built, having a few cafés and ruined bazars. Fives miles to the W. are the great pyramids, which have been named from this town, and, here also is the famous Sphinx (*q.v.*), these together forming an attraction for crowds of visitors. Pop. about 11,500. See Pyramid.

Ghohona Grass, a poisonous grass, growing in India. It is said to render the milk of the cattle which feed upon it narcotic and drastic.

Ghore. See Ghure.

Ghoorkas. See Ghurkas.

Ghost Dance, a religious ceremony which originated among the Piute Indians in Nevada about 1889, so named from the fact that the dancers wear a white shirt over their ordinary dress. It was the outcome of a religious belief which maintained that a messiah was soon to appear, who would rid the land of the white man and restore to the Indians all their rights. A Piute Indian named Wikova and known among the whites as "Jack Wilson," claimed to be this savior and obtained a marvelous influence over not only his own tribes but those of the surrounding country who sent their chiefs to listen to his teachings. These were very much in the same line as those of modern spiritualists, he promising to procure them communication with the spirits of deceased friends. He advocated peace and refused to allow any references in their ceremonies to warlike subjects. The ghost dance is held at night, men and women joining hands and circling around (singing the ghost songs, which are principally chants in the form of messages from their spirit friends). Sometimes the participants appear to fall into a trance during which they are supposed to commune with residents of the other world. The Sioux outbreak of 1890-1891 was due indirectly to the ceremonies of this dance and the United States government sought to suppress it. Since that time no trouble has arisen, though it is still practised by the Indians.

Ghost Moth, a moth, *Hepialus humuli.* The expansion of wings in the male is about 2, and in the female 2½ inches. The former has the wings snowy white, with the costæ and fringes brownish; the female has the fore wings deep dull yellow, with a streak and some spots brick red; the hind wings are of a dull lead color at the base, shaded with orange. The larva feeds underground on the roots of hop, burdock, nettle, etc., from autumn to spring. The perfect insect, which is common, appears

in June. The males, the sex with the ghostly appearance, have a peculiar flight, oscillating backward and forward like a pendulum, but remaining for some time at one spot.

Ghubbet Daknu. See ANNESLEY BAY.

Ghur (gör), or **Ghore** (gōr), a mountainous district of Western Afghanistan, lying S. E. from Herât and N. W. from Kandahar; inhabited by Hazaras and Eimaks, and since 1845 has been included in the territory of Herât.

Ghuri, a dynasty of princes who had the seat of their empire in the country of Ghûr, and ruled over Persia, Afghanistan, Northern Hindustan, and Transoxiana. We first read of Ghûr in connection with Mahmud of Ghazni and his son Masaud, the latter of whom subjugated the region in 1020. About a century later Malik Izzuddin made himself ruler of all the Ghûr country. His son, Alauddin Jahansoz (the Burner), fell upon Ghazni, and took it and burned it to the ground. This prince's nephews, Ghiyassuddin and Muizuddin, established their power in Khorasan and Ghazni. The latter, crossing the Indus, then conquered successively the provinces of Multan (1176), Lahore (1186), and Ajmere (1190), and, in the course of the next six years, all Hindustan as far S. as Nagpur and E. to the Irawadi. On the death of Muizzuddin the Indian States asserted their independence, the power of the Ghûri being confined to Ghûr, Seistan, and Herât. This last feeble remnant was taken from them by the Shah of Kharezm about 1215. Some 30 years later the Ghûr princes managed to revive something of their former power at Herât, which they retained by sufferance from the Mongols down to 1383, when the city was captured by Timur, and the Ghûr sovereignty came to an end.

Ghurkas, or **Ghoorkas,** a native race in the kingdom of Nepal. They are of Hindu descent and speak a dialect derived from the Sanskrit. They are largely employed as soldiers in the Anglo-Indian army and are among its best troops.

Ghuzel-hissar, a town of Anatolia in Asia Minor, 55 miles from Smyrna, the site of ancient Tralles.

Giacomo da Ponte. See BASSANO, JACOPO.

Giacometti, Paolo (jä-kō-met'tē), an Italian dramatist; born in Novi Ligure, Italy, March 19. 1816. He achieved distinction in his 20th year with a drama, "Rosilda," written during his law-student days in Genoa. Forced into literary work by his family's poverty, his dramaturgic talent attained him a competence. Sickness and domestic adversity did not interfere with his prolific genius, and his plays show astonishing versatility. "Queen Elizabeth of England," "Torquato Tasso," and "Lucrezia Davidson," tragedies; "Sophocles," his masterpiece, also a tragedy; and numerous comedies, including "The Woman with a Second Husband," are among the popular examples of his work. He died in Rome, Italy, August, 1882.

Giacomino da Verona (jä-ko-mē'nō dä vā-rō'nä), an Italian poet of the 13th century. He owes his importance in literature chiefly to his anticipation of Dante, and such influence as his work may have had upon the form and spirit of the "Divine Comedy." He would appear to have been a Franciscan monk, who composed two crude but striking poems in the Veronese dialect on the subjects respectively of heaven and hell, "The Celestial Jerusalem" being one and "The Infernal City of Babylon" the other.

Giacosa, Giuseppe (jä-kō'sä), an Italian dramatist; born in Colleretto-Parella, Piedmont, Oct. 21, 1847. A lawyer for many years, the success of one or two plays in metrical form, the fruit of his leisure, led him to turn playwright solely. His wit and taste have long made him popular. "The Husband in Love with his Wife" and "Brothers in Arms" are his best productions, but of great merit are "The Sons of the Marquis" and "Arthur." He is the author of both dramas and comedies, and his treatment of contemporary Italian social life is irresistibly satirical.

Gia-dinh. See SAIGON.

Giallolino (jäl-lō-lē'nō), an earth of a bright gold color, found in the Neapolitan territory; it is very fine, and much valued by painters as a pigment.

Giannone, Pietro (jän-nō'ne), an Italian author; born in Ischitella, Italy, May 7, 1676. He studied law in Naples, and after winning a high place as an advocate retired to give himself up to the execution of his great work, the "Civil History of the Kingdom of Naples" (1723). The severity with which Giannone treated the Church drew upon him the persecutions of the court of Rome. The offensive publication was burned, and the author excommunicated. Giannone therefore quitted Naples, 1723, and took refuge in Vienna, where, for a time, he was protected by the influence of powerful friends, but had ultimately to depart to Venice in 1734. Expelled from Venice by the suspicious republic, he finally took refuge in Geneva. Here he wrote his "Triregno" a bitter attack on the papal pretensions. In 1736, having been enticed by a government emissary to enter the Sardinian States, he was seized and imprisoned in the citadel of Turin, where he died March 7, 1748.

Giauque, Florien (jē-auk'), an American lawyer; born near Berlin, O., May 11, 1843; was graduated at Kenyon College in 1869; served in the Union army in 1862–1865; was admitted to the bar in 1875 and began practice in Cincinnati. His publications include "Present Value Tables"; "Drainage Laws"; "Naturalization and Election Laws of the United States"; "Ohio Election Laws"; etc.

Giant, The, a name given to the Nile river by the Egyptians.

Giant, or **Gallinula,** (lin'ū-lä), an extinct bird, allied to the gallinules, which formerly inhabited the Mascarene Islands, having been observed alive as late as 1694. It was a little over 6 feet high.

Giant Beds (in German, *Hünengräber*), tumuli in Germany, the graves of the ancient inhabitants of the country. They are of different sizes and sometimes very large, generally inclosed with stones of such weight as would seem to have required machinery to move them. Earthen vessels, metallic ornaments, sacrificial stones, knives, battle-axes, etc., are sometimes found in them; and sometimes also human skeletons in the last stage of decay; sometimes they are entirely empty. They are found chiefly in woods and in high places, having probably disappeared from other parts in consequence of the advance of agriculture, bringing the low-lying tracts under cultivation.

Giant Clams, the English name given to *Tridacnidæ*, a family of conchiferous mollusks. The species called *Tridacna gigas* sometimes weighs 500 pounds.

Giant Fennel, in botany, the genius *Ferula*, the species of which are found in the S. of Europe, the N. of Africa, Persia, Siberia, etc. *Ferula persica* is the assafœtida.

Giant Puffball, in botany, a fungus, *Lycoperdon giganteum*, often many feet in circumference, filled with a pulpy mass, which has been used for a styptic and for tinder.

Giants, people of extraordinary stature. We find in history mention made of giants, and even of whole races of remarkable stature, but this in general occurs only at an early stage of civilization when the national mind is apt to exaggerate anything unusual. The first mention of giants in the Bible is in Gen. vi: 4, where the Hebrew word used is *nephilim*, a word which occurs in only one other passage, where it is applied to the sons of Anak, who dwelt about Hebron, and who were described by the terrified spies as of such size that compared with them they appeared in their own sight as grasshoppers. A race of giants called the Rephaim is frequently mentioned in the Bible, and in Gen. xiv. and xv. appear as a distinct tribe, of whom Og, King of Bashan, is said to have been the last. Other races of giants are mentioned, such as the Emim, the Zuzim, and the Zamzummim. The giants of old Greek or of Norse mythology have, of course, merely a symbolic existence, representing benignant or adverse forces of nature on which man might count in his struggle to reduce the world around him into some kind of order. The tales of old writers regarding gigantic human skeletons have now no importance, it being mostly certain that these bones do not belong to giants, but to animals of the primitive world which, from ignorance of anatomy, were taken for human bones. A gigantic human skeleton, however, the largest ever recorded, was found in 1899, near Miamisburg, O., in a locality which contains many relics of the mound builders. It is of prehistoric age and is fossilized. It must have belonged to a man 8 feet 1½ inches high, and extremely well proportioned. The skull is of an extremely low order and resembles that of the gorilla, the jaws projecting beyond the face. The teeth are remarkably strong and beautiful in form, and their owner must have lived on a vegetable diet.

The following are among authentic instances of persons who attained to the stature of giants: The Roman Emperor Maximin, a Thracian, nearly 9 feet high; Queen Elizabeth's Flemish porter, 7 feet 6 inches; C. Munster, a yeoman of the guard in Hanover, who died in 1676, 8 feet 6 inches high; Cajanus, a Swedish giant, about 9 feet high, exhibited in London in 1742; C. Byrne, who died in 1783, attained the height of 8 feet 4 inches; Patrick Cotter O'Brien, who lived about the same time, was 8 feet 7¾ inches; a Swede in the celebrated grenadier guard of Frederick William I. of Prussia stood 8½ feet. In 1844 died Pauline Wedde (called Marian), over 8 feet 2 inches at the age of 18. The following are still or were quite recently exhibiting: Anna Swan, a native of Nova Scotia, above 8 feet high; her husband, Captain Bates, a native of Kentucky, of the same height; Chang-wu-gon, the Chinese giant, 7 feet 9 inches high.

Giants' Causeway (deriving its name from a legend that it was the commencement of a road to be constructed by giants across the channel to Scotland), a natural pier or mole of columnar basalt, projecting from the N. coast of Antrim, Ireland, into the North Channel, 7 miles N. E. of Portrush. It is part of an overlying mass of basalt from 300 to 500 feet in thickness, which covers almost the whole county of Antrim, and the E. part of Londonderry. It is exposed for 300 yards, and exhibits an

unequal pavement, formed of the tops of 40,000 vertical closely fitting polygonal columns, which in shape are chiefly hexagonal. The diameter of the pillars varies from 15 to 20 inches. Each pillar is divided into joints of unequal length, the concave hollow at the end of one division fitting exactly into the convex projection of the other. The rock is compact and homogeneous, and is somewhat sonorous when struck with a hammer. The Giant's Causeway is itself formed of three causeways, the Little, Middle or Honeycomb, and the Grand Causeway. On the Little Causeway may be seen an octagon, pentagon, hexagon, and heptagon all together; on the Middle Causeway is the famous Wishing Chair, with two arms and a back, on a platform where the columns rise to a height of about 10 feet. On the Grand Causeway are pointed out the Lady's Fan, an exact arrangement of five perfect pentagons surrounding a heptagon; the Keystone of the Causeway — a sunk octagon; and the single triangle. At the starting point is the Giants' Loom, an imposing row of columns 30 feet high, each intersected by about 30 joints; to the left is the Giants' Well, to the right the Giants' Chair.

Giants' Kettles, the name given in Norway to vertical pot-shaped, smooth-sided hollows excavated in rocks, usually filled up with rounded bowlders, water-worn stones, gravel and other detritus. They are believed to have originated under the great glaciers which formerly covered wide regions of Northern Europe. They have probably been formed by water descending from the surface of the ice through moulins or glacial chimneys — setting stones and bowlders in rapid rotation. As they rotate they gradually wear away the rock, and produce more or less steep-sided cavities. Giants' kettles occur in connection with the glacial deposits of many other countries.

Giants' Mountains. See RIESENGEBIRGE.

Giarre (jär're), a town of Sicily, in the province of Catania, on the E. slope of Mount Etna. The surrounding district produces excellent wine. Pop. 12,769.

Giarretta (jär-ret'tä), or **Simeto** (sē-mā'tō), a river of Sicily, which, with its affluents, the Adriano, Trachino, Dettaino, and Chrisas, waters the plain of Catania, and the portion of the island W. of Mount Etna. It rises 20 miles S. E. of Caronia, and after a very tortuous course of 50 miles enters the Mediterranean 6 miles S. of Catania.

Gibbet, a gallows on which the bodies of criminals who had been guilty of particularly atrocious crimes were suspended after execution, encased in an iron frame, near the spot where the crime was committed. This was done for the purpose of striking terror into the evil-minded, and of affording "a comfortable sight to the relations and friends of the deceased." The practice, first recognized by law in 1752, was abolished in 1834.

Gibbon, a genus of tailless anthropoid apes, natives of the East Indies. They are nearly allied to the orangs and chimpanzees, but are of more slender form, and their arms so long as almost to reach the ground when they are placed in an erect posture; there are also naked callosities on the buttocks. In this respect they differ from the other anthropoid apes and are allied to some of the catarrhini; in other respects also the gibbons are the lowest among the anthropoid apes, and connect them with the catarrhini. The gibbons are inhabitants of forests, their long arms enabling them to swing themselves from bough to bough, which they do to wonderful distances and with extreme agility. They cannot, however, move with ease or rapidity on the ground. The conformation of the hinder extremities adds to their difficulty in this, while it increases their adaptation to a life among the branches of trees, the soles of the feet being much turned inward. None of the gibbons are of large size. There are some 8 or 10 species. The common gibbon, or lar gibbon, is found in some parts of India, and in more E. regions. The active gibbon, found in

ACTIVE GIBBON.

Sumatra, is particularly remarkable for the power which it displays of flinging itself from one tree to another.

Gibbon, Charles, a British novelist; born in 1836. The Scotch masses were studied by him with enthusiasm, affording subjects for "Robin Gray" and the Jacobite tale "For the King"; but his "For Lack of Gold" and "A Heart's Problem,"

and one or two more, indicate exhaustion, though "The Braes of Yarrow" is a fine work. He died Aug. 15, 1890.

Gibbon, Edward, an English historian; born in Putney, April 27, 1737; studied at Westminster School, Magdalen College, Oxford, and Lausanne. On returning to England he prepared himself for authorship. In 1763 he went to Italy; and while sitting

EDWARD GIBBON.

amid the ruins of the Capitol at Rome, he conceived the idea of writing the history of the decline and fall of that city. In the meantime he joined M. Deyvurdun, a Swiss scholar, in publishing a journal called "Literary Memoirs of Great Britain," which met with no success. In 1770 he began his celebrated history of the "Decline and Fall of the Roman Empire." Previous to this undertaking Gibbon was chosen member of Parliament for Liskeard; and when hostilities commenced between England and France, in 1778, he was employed to draw up the manifesto on that occasion, after which he was made Commissioner of the Board of Trade, but lost his place on the change of administration in 1783. He then went to reside at Lausanne, where he remained till the French Revolution obliged him to return to England. He died in London, Jan. 16, 1794.

Gibbons, James, an American clergyman; born in Baltimore, Md., July 23, 1834; was taken to Ireland by his parents early in life. Returning to the United States in 1848 he settled in New Orleans; was educated at St. Charles College, Maryland, and at St. Mary's Seminary, Baltimore; was ordained to the Roman Catholic priesthood in June, 1861; and appointed as assistant in St. Patrick's Cathedral, Baltimore. Later he became the private secretary of Archbishop Spalding, and chancellor of the diocese. In 1868 he was made vicar-apostolic of North Carolina, with the rank of bishop; and in 1877 became Archbishop of Baltimore. He was elevated to the cardinalate in 1886, being the second Roman Catholic in the United States to receive that promotion. In 1891 Cardinal Gibbons denounced CAHENSLYISM (*q. v.*) as disloyal and unpatriotic, an action which soon made the movement unpopular. His publications include "The Faith of Our Fathers," "Our Christian Heritage," and "The Ambassador of Christ."

Gibbons, James Sloane, an American banker; born in Wilmington, Del., July 1, 1810; early became a strong abolitionist. In 1863 his house in New York was sacked by a mob, during the draft riots, because he had illuminated it in honor of Abraham Lincoln. His fame rests chiefly on his patriotic song, which was very popular during the Civil War, "We Are Coming, Father Abraham, Three Hundred Thousand More." He died in New York city, Oct. 17, 1892.

Gibbs, John Blair, an American physician; born in Richmond, Vt., about 1858; was graduated at Rutgers College in 1878, and at the New York College of Physicians and Surgeons in 1882. Later he was an instructor in the Post-Graduate Hospital. After hearing of the American naval victory in Manila Bay in 1898 he decided to enter the navy, and was made assistant surgeon on the monitor "Miantonomoh," but a little later was assigned to the "Panther," which landed 600 marines at GUANTANAMO BAY (*q. v.*), Cuba. On June 12, after the landing, when the Spaniards made an attack on the Americans he was one of the four men killed in the action.

Gibbs, Oliver Wolcott, an American chemist; born in New York city, Feb. 29, 1822; was graduated at Columbia College in 1841 and at the New York College of Physicians and Surgeons in 1845; was Professor of Physics and Chemistry in the College of the City of New York in 1849-1863; and Rumford Professor in Harvard University in 1863-1887. He made numerous valuable chemical researches, and contributed largely to scientific periodicals, principally "The American Journal of Science and Arts," of which he was one of the editors for many years. Dr. Gibbs was the only American honorary member of the German Chemical Society; and an original member of the National Academy of Sciences. He died Dec. 9, 1908.

Gibbsite, a hexagonal or monoclinic white, grayish, greenish, reddish-white, or reddish-yellow, translucent mineral, emitting, when breathed upon, an argillaceous smell. Hardness, 2.5 to 3.5; specific gravity, 2.3 to 2.4. Composition: Alumina, 65.6; water, 34.4 = 100. Found in the Ural Mountains and in various places in the United States. The varieties are: (1) In crystals, hydrargillite; (2) Stalactitic, gibbsite proper.

Gibeah, the birthplace of Saul, and the scene of Jonathan's romantic exploit against the Philistines, about 5 miles N. by E. of Jerusalem.

Gibel, a fish, the Prussian carp. It may be distinguished from the common carp by the absence of barbules on its lips. Its weight is generally half a pound, though it has been found four times as much. It is a good fish for the table. It derives its name from a tradition that it was introduced from Germany.

Gibeon, a city of ancient Palestine on a hill among the mountains of Benjamin, 5 miles N. W. of Jerusalem. At the conquest of Canaan by the Israelites under Joshua, it was inhabited by Hivites. By a clever strategem the Gibeonites insured the alliance and protection of the invaders, but their deceit being afterward found out, they were reduced to a condition of servitude, being made "hewers of wood and drawers of water unto all the congregation." When the five kings of the Amorites besieged Gibeon for having entered into a traitorous compact with the common enemy of all the Canaanites, Joshua hastened to its help, and overthrew the besiegers with great slaughter. It was there that Joshua, in the words quoted from the book of Jashar (Josh. x: 12), commanded the sun to stand still upon Gibeon, and the moon in the valley of Ajalon."

Gibing, or **Jibing,** in sailing with fore and aft sails, the act of shifting over the boom, when the wind is astern or at any point abaft the beam, so that the wind may be brought to bear on the sail on the reverse side of the vessel to that in which it was felt previous to the operation. With a change of wind or course the boom and its sail are gibed to the other side of the vessel. This maneuver may be described as the reverse of that of tacking.

Giblet Check, or **Jiblet Cheek,** a term used by stone masons to signify a rebate round the rybates, etc., of a doorway or gateway, for the reception of a door or gate intended to open outward.

Gibraltar, a town and strongly fortified rocky peninsula near the S. extremity of Spain, belonging to Great Britain. It is connected with the mainland by a low sandy isthmus, 1½ miles long and ¾ mile broad, known as the "neutral ground," with Gibraltar Bay on the W., the open sea on the E. and S. The highest point of the rock is about 1,400 feet above sea-level; its N. face is almost perpendicular, while its E. side exhibits tremendous precipices. On its S. side it is almost inaccessible, making approach from seaward impossible; the W. side, again, although very rugged and precipitous, slopes toward the sea; and here the rock is secured by extensive and powerful batteries, rendering it apparently impregnable. Vast sums of money and an immense amount of labor have been spent in fortifying this celebrated stronghold, which, as a coaling station, depot for war material, and a port of refuge in case of war, would form one of the most important points of support for British naval operations and British commerce.

The town of Gibraltar is situated on the W. side of the peninsula, terminating in Europa Point, and thus fronts the bay. It consists chiefly of one spacious street about half a mile in length, lined with shops, and paved and lighted. The principal buildings are the governor's and lieutenant-governor's houses, the admiralty, naval hospital, victualing office, and barracks, and a handsome theater. Its water supply is derived from the rainfall. Gibraltar is a free port, and has a considerable shipping trade, being an entrepôt for the distribution of British manufactures. The chief export is wine. The administration is vested in the governor, who is also commander-in-chief of the troops. Every precaution is taken to prevent the immigration into the town of new residents. It was ultimately taken by the Spaniards from the Moors in 1462, fortified in the European style, and so much strengthened that the engineers of the 17th century considered it impregnable. It was taken, however, after a vigorous bombardment in 1704 by a combined English and Dutch force under Sir George Rooke and Prince George of Darmstadt, and was secured to Great Britain by the peace of Utrecht in 1713. Since then it has remained in British hands, notwithstanding some desperate efforts on the part of Spain and France to retake it. In 1779, Great Britain being then engaged in a war with its revolted colonies and with France, a last grand effort was made by Spain to recover Gibraltar. The siege lasted for nearly four years. It was heroically and successfully defended, however, by General Elliott (afterward Lord Heathfield) and the garrison. Since that time, in the various British and Spanish, and also French wars, Gibraltar has only been blockaded on the land side.

Gibraltar, Bay of, an inlet of the sea formed by the headland of Cabrita and Europa Point, 4 miles distant from each other, and is spacious and well adapted for shipping, being protected from all the more dangerous winds; the extreme depth within the bay is 110 fathoms. To increase the security of the harbor, two moles have been constructed, which respectively extend 1,100 and 700 feet into the bay. The Spanish town and port of Algesiras lie on its W. side.

Gibraltar, Straits of, the straits connecting the Mediterranean Sea with the Atlantic Ocean extending from Cape Spartel to Cape Ceuta on the N. W. coast of Africa, and from Cape Trafalgar to Europa Point on the S. W. seaboard of Spain. They narrow toward the E., their width between Europa Point and Cape Ceuta being only 15 miles, while at the W. extremity it is 24 miles. Length, E. to W., about 36 miles. Through these straits a constant current runs so strongly from the Atlantic that sailing vessels bound W. can pass them only by the aid of a Levanter, or strong breeze from the E. It is believed that the waters of the Mediterranean find an outlet here by means of an under-current.

Gibraltar Monkey, an originally African monkey, a colony of which is wild on the rocks of Gibraltar.

Gibraltar of America, Quebec, Canada; so .called on account of its commanding situation and its well-nigh impregnable defenses, both natural and artificial. It is the most securely fortified city in America.

Gibraltar of the East, Aden, a town and seaport of Arabia. Since 1839 it has belonged to the British, and its fortifications have been greatly strengthened and improved. The citadel is built on a rocky eminence, and is of great strategic importance, having a position between Asia and Africa like that of Gibraltar between Europe and Africa.

Gibson, John, an English sculptor; born near Conway, in Wales, July 19, 1790. He was the son of a landscape-gardener, and was apprenticed to a wood-carver at Liverpool, where he attracted attention by a figure of Time modeled in wax which he exhibited at the age of 18. The patronage of W. Roscoe assisted him to go to Rome, where he was cordially received by Canova. On the death of Canova in 1822 Gibson entered the studio of Thorwaldsen. In 1836 he was made a Royal Academician; but to the end of his life he continued to make Rome his chief place of residence. Among his best works are: "The Wounded Amazon"; "The Hunter and His Dog"; "Hylas and the Nymphs," "Helen," "Proserpine," and "Sappho." One of his peculiarities as an artist was the practice of coloring his statues. He died in Rome, Jan. 26, 1866.

Gibson, Thomas Milner, an English politician; born in Trinidad, W. I., Sept. 3, 1806; graduated at Trinity College, Cambridge, in 1830. He entered Parliament for Ipswich as a Conservative in 1837; but shortly afterward became a convert to Liberalism, and was returned for Manchester in 1841, and during the succeeding five years he occupied a prominent position among the orators of the Anti-corn-law League. When the Whigs came into office in July, 1846, he was made a privy-councillor and vice-president of the board of trade, but resigned office in April, 1848. On the outbreak of the war with Russia he espoused the doctrines of the "Manchester school," or "Peace party." While sitting for Ashton-under-Lyne in 1857–1868 he was appointed president of the board of trade, and also ad-interim president of the poor-law commission. It was mainly through Gibson's instrumentality that the advertisement duty was repealed in 1853, the newspaper stamp duty in 1855, and in 1861 the paper duty. He died in Algiers, Feb. 25, 1884.

Gibson, William Hamilton, an American artist and author; born in Sandy Hook, Conn., Oct. 5, 1850; contributed to the "American Agriculturist" and "Hearth and Home," and supplied many natural-history subjects for the "American Cyclopædia." Many of his illustrations appeared in the "Art Journal" and in "Picturesque America"; and his illustrations of books were numerous and popular. He was a member of the Art Union and the Authors' Club. The essays "Birds of Plumage," "A Winter Idyl," and "Springtime," appeared in "Harper's Magazine." His later works included "Our Edible Toadstools and Mushrooms." He died in Washington, Conn., July 16, 1896.

Giddings, Franklin Henry, an American educator; born in Sherman, Conn., March 23, 1855; was graduated at Union College in 1877; accepted the chair of sociology in Columbia University in 1894. He is the author of "The Principles of Socïology"; "The Theory of Socialization"; "The Elements of Sociology"; "Democracy and Empire"; etc.

Giddings, Joshua Reed, an American statesman; born in Athens, Pa., Oct. 6, 1795; admitted to the Ohio bar in 1820; elected a member of its Legislature in 1826, and of Congress in 1838, where he was prominent as an opponent of slavery. In 1861 he was appointed consul-general to British North America. Among his works are: "The Exiles of Florida" (1858); "History of the Rebellion" (1864). He died in Montreal, May 27, 1864.

Gideon, a judge of Israel. He was the youngest son of Joash, of the house of Abiezer, and lived with his father at Ophrah, in Manasseh. During his youth Israel was sunk in idolatry and sloth, and was oppressed by the plundering incursions of the Amalekites and Midianites. Confident in the assurance of supernatural direction, he mustered the people, reduced the unwieldy host to a handful of resolute men, fell suddenly upon the enemy in the neighborhood of Mount Gilboa, and routed them with great slaughter.

Gièn (zhyan), a town of the department of Loiret, France, 37 miles S. E. of Orleans. Its manufactures include earthenware, serge and leather. Gièn has a handsome stone bridge across the Loire. Here, in 1410, a treaty was signed by the young Duke d'Orleans, with the dukes of Berry, Bourbon and Brittany, against John the Fearless, Duke of Burgundy, to avenge the assassination of his father, Louis I. Pop. (1891) 8,519.

Giers, Nicholas Carlovitch de (gērz), a Russian statesman; born May 21, 1820. After holding various posts, in 1875 he became adjunct to Prince Gortchakoff, the minister of foreign affairs, whom he succeeded in 1882. His policy in general is understood to be of peaceful tendencies, and in particular opposed to Panslavistic ideas of development. In Central Asia, however, M. de Giers has continued the policy of advance, and in 1885 the Russian occupation of positions within the Afghan frontier nearly brought about a war with Great Britain. He died in St. Petersburg, Jan. 26, 1895.

Giesebrecht, Ludwig (gē′ze-brecht), a German poet; born in Mirow, Mecklenburg-Strelitz, July 5, 1792; studied at the University of Berlin, and later at Stettin; fought in the German war of liberation in 1813; and subsequently became a professor. "Epic Poems," "Wendish Tales," and poetry in dialect, comprise his most popular productions. He died in Jasenitz, near Stettin, March 18, 1873.

Giesebrecht, Wilhelm von, a German historian; born in Berlin, March 5, 1815; became Professor of History at Königsberg in 1857, and in 1862 at Munich. His chief works are: "History of the German Empire" (1855-1880); "A Yearbook of the German Empire" (1840); a translation of Gregory of Tours (1851); "German Conversation" (1871); "Arnold von Brescia" (1873). He died Dec. 18, 1889.

Gieseler, Johann Karl Ludwig (gē′zeler), a German historian; born in Petershagen, near Minden, March 3, 1793; studied at Halle, and in 1813 volunteered as a soldier during the war of liberation. After the peace he returned to teaching, became conrector of the gymnasium at Minden, next director of the new gymnasium at Cleves. His "Origin and Early Fate of the Written Gospels" (1818) demolished the prevalent theory of a primitive written gospel, and procured him the chair of theology at the new University of Bonn. Hence he was called to Göttingen in 1831, where he became in 1837 a consistorial councillor. His great work is the "Manual of Ecclesiastical History" (1824–1857). He died in Göttingen, July 8, 1854.

Giessen (gēs′sen), a town of Hesse-Darmstadt, Germany, at the confluence of the Wieseck and the Lahn, 40 miles N. of Frankfort-on-the-Main. It is the seat of a university, founded in 1607, which possesses well-appointed laboratories, collections, and museums, and a good library, with 72 professors and 672 students in 1899. Pop. (1905) 28,769.

Giffen, Sir Robert, an English economist; born in Strathaven, Scotland, in 1837; went to London in 1862, where he was sub-editor of the "Globe" till 1866. He was acting editor of the "Economist" under Walter Bagehot 1868-1876; then founded the "Statist" and became chief of the Statistical Department in the board of trade and assistant secretary in 1882. He was John Morley's assistant on the "Fortnightly Review" in 1873-1876; and the author of reports, papers, and essays which gave him a high rank. His works include "American Railways as Investments"; "Stock Exchange Securities"; "Essays in Finance"; "The Progress of the Working Classes in the Last Half Century." He died April 12, 1910.

Gifford, Adam, a Scotch philanthropist; born in Edinburgh in 1820; studied at the university there, and was called to the Scotch bar in 1849. He died in Granton, near Edinburgh, Jan. 20, 1887. By his will he left $125,000 to the University of Edinburgh, $100,000 each to Glasgow and Aberdeen, and $75,000 to St. Andrews, to endow lectureships in natural theology.

Gifford, Robert Swain, an American artist; born in Naushon Island, Mass., Dec. 23, 1840; received a common school education; studied with Albert Van Beest in Rotterdam, Holland; traveled through California and Oregon in 1869, and in Europe and North America in 1870-1871. His principal works include "The Rock of Gibraltar"; "A Lazy Day in Egypt"; etc. He died Jan. 15, 1905.

Gifford, Sandford Robinson, an American artist; born in Greenfield, N. Y., July 10, 1823; was educated at Brown College; studied painting under John R. Smith and in Europe in 1855–1857. His works include "A Lake Scene on the Catskills"; "Ruins of the Parthenon"; "Sunrise on the Matterhorn"; "Home in the Wilderness"; "Lake Geneva"; "Fishing-Boats in the Adriatic"; "San Giorgio, Venice"; etc. He died in New York city, Aug. 29, 1880.

Gifts, in theology, endowments, some of them high; the majority, superhuman, conferred on individuals in the early Church by the Holy Spirit, whence they are called spiritual gifts. St. Paul enumerates the word of wisdom, that of knowledge; faith, the gift of having ability to work miracles, to prophesy, to succeed in the discerning

of spirits, to speak with divers tongues or interpret those tongues when spoken by others.

Giga (jē′gä), or **Gigue** (jig), the name of a short piece of music, much in vogue in olden times; of a joyful and lively character, and in 6-8 or 12-8 time, sometimes in ⅜; used formerly as a dance tune, and often introduced as a movement of a larger composition. Jig is a form of the same word: the Irish jig is a dance tune in 6-8 time.

Gihon, Albert Leary, an American sanitarian; born in Philadelphia, Pa., Sept. 28, 1833; was graduated at the Philadelphia High School in 1850; Professor of Chemistry and Toxicology in the Philadelphia College of Medicine and Surgery in 1853–1854; appointed assistant surgeon in the United States navy in 1855; took part in the attack and capture of the barrier forts, near Canton, China, in 1856; and served throughout the Civil War. He was promoted medical director U. S. N., May 1, 1895, and was retired with the rank of commodore, Sept. 28, following. He has published "Practical Suggestions in Naval Hygiene"; "Need of Sanitary Reform in Ship Life"; "Sanitary Commonplaces Applied to the Navy"; "Prevention of Venereal Diseases by Legislation"; and was editor of "Annual of the Medical Sciences" for six years. He died in New York city, Nov. 17, 1901.

Gijon (hē-hōn′), a city and seaport of Spain, on the Bay of Biscay, 20 miles N. E. of Oviedo. It manufactures tobacco, glass, and earthenware; exports butter, cheese, fruits, hazelnuts and copper ore; and imports grain, flour, sugar, oil, iron, machinery, spirits, chemicals, and woven goods. Here Jovellanos, a native of Gijon, founded the Collegiate Asturian Institute.

Gila, Rio, a river of North America, an affluent of the Colorado of the West, origin in New Mexico; length, 450 miles. Its upper course is through mountains, with many deep and precipitous cañons; further S. it flows through an open and comparatively level country, the valley being productive when irrigated. About 200 miles from the Colorado is the reservation of the Maricopa and Pima Indians. Ancient ruins are numerous on the banks of the Gila.

Gila Monster, a poisonous lizard also called Sonoran heloderm. It is one of the largest lizards of North America, and is found in the sandy deserts of New Mexico, Arizona, and Texas. Its scales are brilliant orange and jet black. It has grooved teeth and highly developed salivary glands at their bases. Its bite is rapidly fatal to small mammals and birds, and very injurious, though seldom fatal, to man. The heloderms are the only lizards ascertained to be venomous.

Gilbert, Charles Henry, an American educator; born in Rockford, Ill., Dec. 5, 1859; was graduated at Butler University, Ind., in 1879; became Professor of Zoölogy in the Leland Stanford University in 1891. He is the author of "Synopsis of the Fishes of North America."

Gilbert, Mrs. George H., an English actress; born in Rochdale, England, Oct. 21, 1821; was a graceful dancer in early life, and later became very successful in high comedy. She visited the United States in 1846, and in 1849 made her home here. For many years before her retirement she was a member of the Daly company. On Oct. 21, 1899, her birthday was observed by her admirers by a special performance, a reception, and the presentation of a silver service at the Lyceum Theater, New York city. She died Dec. 2, 1904.

Gilbert, Sir Humphrey, an English navigator; born in Dartmouth, Devonshire, in 1539; educated at Eton and Oxford. Then, abandoning law for a career of arms, he did such good service against the Irish rebels as earned him knighthood and the government of Munster (1570), after which he saw five years' campaigning in the Netherlands. In 1576 appeared his "Discourse on a Northwest Passage to India," which was published by George Gascoigne without his knowledge; two years later he obtained a royal patent to "discover and occupy remote heathen lands not actually possessed of any Christian prince or people." With his younger half-brother, Sir Walter Raleigh, he sailed in quest of the "Unknown Goal"; but this expedition in 1578-1579 was frustrated by internal dissensions, tempests, and a smart brush with the Spaniards. He set sail from Plymouth in June, 1583, and in August landed in Newfoundland, of which he took formal possession for Queen Elizabeth. But, sailing S. he lost off Cape Breton the largest of the three vessels left out of five, so was forced to start for home, but was shipwrecked and drowned Sept. 9, 1583.

Gilbert, Sir John, an English painter; born in Blackheath, near London, in 1817; placed at a mercantile house in the city; and later studied art. In 1836 he began to exhibit both in oil and water colors; and in 1852 he was elected an associate, in 1853 a member, in 1871 the president of the Society of Painters in Water-colors, receiving soon after the honor of knighthood. He also became an A. R. A. in 1872, an R. A. in 1876, and a Chevalier of the Legion of Honor. His oil paintings include "Don Quixote and Sancho Panza," "Education of Gil Blas," "Murder of Becket," "Joan of Arc Entering Orleans," "Crusaders," "Wolsey at Leicester," and "Morning of Agincourt." He died in Villers-sur-Mea, France, Oct. 6, 1897.

Gilbert, John Gibbs, an American comedian; born in Boston, Mass., Feb. 27, 1817. He made his first appearance as Jaffier in "Venice Preserved," in his native city, Nov. 28, 1828. His best characters include Sir Peter Teazle, Sir Anthony Absolute, and Job Thornberry. His professional tours, both in the United States and Europe, were eminently successful. He died in Boston, Mass., June 17, 1889.

Gilbert, Sir John Thomas, an Irish historian; born in Dublin, Ireland, 1829; became editor of a series of important publications entitled "Historic Literature of Ireland." To his enterprise and energy is largely due the revival of interest in Celtic studies. His principal published works include: "History of the City of Dublin" (1854-1859); "History of Affairs in Ireland, 1641-1652"; "History of the Irish Confederation and War in Ireland, 1641-1649." He died May 23, 1898.

Gilbert, Rufus Henry, an American inventor; born in Guilford, N. Y., Jan. 26, 1832; was graduated at the New York College of Physicians and Surgeons; served as surgeon in the Union army in the Civil War; and was appointed superintendent and medical director of the United States army hospitals. Owing to the failure of his health after the war he abandoned his profession and engaged in the railroad business, making a special study of the needs of rapid transit in New York city. The result was the erection of the first elevated railroad in that city, the motive power being an endless wire cable. From this beginning the elevated system of today was gradually developed. He died in New York city, July 10, 1885.

Gilbert, William, an English scientist; born in Colchester in 1540; graduated at St. John's College in 1560, and in 1573 settled in London to practise as a physician. He was court physician under Elizabeth and James I., and was president of the College of Physicians in 1600. His leisure time was largely given to the study of magnetism and chemistry. In the former subject he carried on some notable researches, principally contained in "The Magnet, Magnetic Bodies, and the Great Magnet of Tellur" (1600), and the posthumously published "The New Sublunar Philosophy of Our Earth" (1651). Gilbert was the first to use the terms electricity, electric force, and electric attraction and to point out that amber is not the only substance which when rubbed attracts light objects, but that the same faculty belongs to the resins, sealing-wax, sulphur, glass, etc.; and he describes how to measure the excited electricity by means of an iron needle moving freely on a point. He also invented two instruments for finding latitude with the help of astronomical observations. He died in Colchester or London, Nov. 20, 1603.

Gilbertines, a religious order in the Roman Catholic Church, one of the few of English foundation. Its founder in 1148 was St. Gilbert, a native of Sempringham, in Lincolnshire. The rule of the order was mainly derived from that of the Canons Regular of St. Augustine. St. Gilbert also founded an order of nuns after the Benedictine institute. Both orders were approved, and had numerous convents in England at the time of the Reformation, when they shared in the general suppression.

Gilbert Islands, a group on the S. W. coast of the archipelago of Tierra del Fuego, with a good harbor in Doris Cove. Another cluster of the same name, comprising 15 coral islands, forms part of the Mulgrave Archipelago in the Pacific. The two largest are known as Drummond's Isle and Knox's Isle; the former is 30 miles long by rather more than ½ mile broad; the latter 20 miles long. The inhabitants resemble the Malays in appearance, and are divided into three classes — chiefs, landholders, and slaves. The chief products are the cocoanut and the pandanus.

Gilbertite, a whitish, silky mineral: hardness, 2.75; specific gravity, 2.65. Composition: Silica 45.15; alumina 40.11; protoxide of iron 2.43; magnesia 1.90; lime 4.17; and water 4.25. Apparently an impure kaolinite. It occurs near St. Austle in Cornwall, England.

Gilboa (gil-bō'ä), a chain of hills between 500 and 600 feet high, overhanging the site of the ancient city of Jezreel, and rising between the fertile plain of Esdraelon on the W. and the green valley of the Jordan on the E. It is memorable as the scene of the defeat and death of King Saul and his three sons at the hands of the Philistines.

Gilchrist, Alexander, an English author; born in Newington Green in 1828. At the age of 12 he entered University College, London, where for four years he was a diligent scholar and formed a friendship with the Rossettis. He settled in 1853 at Guildford. The "Life of Etty," warmly commended by Carlyle, appeared in 1855. The following year he removed to Chelsea. Here was composed his "Life of Blake." He died in Chelsea, Nov. 30, 1861.

Gilchrist, Anne, an English author; born in London in 1828. In 1851 she married Alexander Gilchrist, and in 1855 began to write for "All the Year Round," in 1861 for "Macmillan's." On her husband's death she undertook the completion of his "Life of Blake" (1863), to the second edition of which (1880) is appended a memoir

of Alexander Gilchrist. In 1869 she published in the American "Radical Review" "A Woman's Estimate of Walt Whitman"; and spent three years in the United States in 1876–1879, when she wrote for "Blackwood's" "Glimpses of a New England Village." In 1883 appeared her "Life of Mary Lamb," and in 1885, only a few months before her death that year, her last essay, "A Confession of Faith."

Gilding, the art of applying and permanently attaching gold leaf or gold dust to surfaces of wood, stone, metals, etc. The Egyptian monuments present numerous traces of the existence of the art in ancient Egypt. The process seems to have been the same with that now used. The Persians were also acquainted with this art, as appears from the ruins of Persepolis. The Greeks and Romans employed gilding for many purposes. The Greeks used to gild the hoofs and horns of victims. The practice of gilding statues prevailed in the infancy of the art of sculpture, and was never entirely dropped by the ancients. The Romans used to gild sweetmeats; and many articles of furniture and utensils which have come down to us are gilt. There are also specimens of gilt glass and metals. The gilding which still remains on some ancient bronze monuments is remakable for its brilliancy. This is owing in part to the great accuracy of the finish, but in part to the thickness of the leaf which was much greater than that of the leaf used by the moderns. Besides we must consider that in the most common way of gilding brass with an amalgam of gold and quicksilver, the gold is reduced to a state of much greater subdivision than in the leaf — the only state in which the ancients employed it. The account of Pliny shows that they did not fix the leaf merely by the aid of fire as is now done in gilding metals, but that they first covered the substance with quicksilver which was then evaporated by heat, in a manner somewhat similar to the modern practice of gilding with amalgam. The ancients carried the practice of gilding to a greater extent than the moderns; they gilded almost all their statues of bronze, wood, or plaster, and frequently those of marble, the ceilings of rooms, and even marble columns, eatables and victims. The *bracteatores,* or *inauratores* were in high esteem among them, and enjoyed an exemption from taxes. In architectural ornaments gilding may please the eye, either from its appearance of richness, or merely from its agreeable color. The most remarkable examples of gilding employed with taste and effect in architecture, are the ceiling of St. Peter's, and that of Santa Maria Maggiore. But artists often fall into the error of mistaking richness of appearance for beauty.

The art of gilding at the present day is performed on metals, or on wood, plaster, leather, parchment, paper, glass, etc. Chemical processes are those which are usually employed for metals. Gilding on copper is performed by the process called wash or water gilding, with an amalgam of gold and mercury. The surface of the copper, being freed from oxide, is covered with the amalgam, and afterward exposed to heat till the mercury is driven off, leaving a thin coat of gold. Copper however is rather too soft and dark-colored a metal for being treated in this way with advantage. Brass is a very suitable metal for this mode of gilding, but the best of all is a mixture of copper with one-seventh of brass. The following method of gilding articles of copper, brass, etc., was patented by Mr. Elkington in 1836: Five ounces troy of fine gold are dissolved by heat in a mixture of 21 ounces of pure nitric acid of specific gracity 1.45, 17 ounces of pure hydrochloric acid of specific gravity 1.15, and 14 ounces of distilled water. The liquid is then poured off into a stone vessel, the sediment being left at the bottom of the vessel in which it was first contained. Four gallons of distilled water and 20 pounds of the best bicarbonate of potash are now added and the whole is boiled moderately for two hours. At the end of this time the mixture is ready for use. The articles are gilded by being attached to wires and plunged into the mixture, where they are allowed to remain as long as the workman thinks necessary, from a few seconds to a minute when the mixture is newly prepared, but longer if it has been used for some time. Gilding is also performed by dipping a linen rag in a saturated solution of gold, and burning it to tinder. The black powder thus obtained is rubbed on the metal to be gilded with a cork dipped in salt water till the gilding appears. Iron or steel is gilded by applying gold leaf to the metal, after the surface has been well cleaned, and heated till it has acquired the blue color, which at a certain temperature it assumes. Several leaves of gold are thus applied in succession, and the last is burnished down cold. The same process may be applied to copper. The operation of gilding may also be performed on iron and steel by diluting the solution of gold in nitro-hydrochloric acid with alcohol and applying it to the clean surface. A saturated solution of gold in nitro-hydrochloric acid, being mixed with three times its weight of sulphuric ether, dissolves the chloride of gold and the solution is separated from the acid beneath. To gild the steel it is merely necessary to dip it, the surface being previously well polished and cleaned, in the ethereal solution for an instant, and on withdrawing it to wash it instantly by agitation in water.

Gilding on wood, plaster, leather, parchment, or paper, is performed by different processes of mechanical gilding. The first

of these is oil gilding, in which gold leaf is cemented to the work by means of oil size. In the case of paper or vellum the parts to be gilded receive a coat of gum water or fine size, and the gold leaf is applied before the parts are dry. They are afterwards burnished with agate. Lettering and other gilding on bound books are applied without size. The gold leaf is laid on the leather and imprinted with hot brass types. Brass rollers with thin edges are employed in the same way for lines, and similar tools for other ornaments. When the edges of the leaves of books are to be gilded they are first cut smooth in the press, after which a solution of isinglass in spirits is laid on, and the gold leaf is applied when the edges are in a proper state of dryness. Japanner's gilding is another kind of mechanical gilding which is performed in the same way as oil gilding, except that instead of gold leaf a gold dust or powder is employed.

Porcelain and other kinds of earthenware as well as glass, may be gilded by fixing a layer of gold in a powdered state by the action of fire. The gold dust or powder required in this operation may be obtained by precipitating it from a solution in aqua regia, either by means of sulphate of iron or protonitrate of mercury. In order that the gold powder may be applied to the surface of the article to be gilded it must be well mixed with some viscous vehicle such as spirits of turpentine mixed with some fatty matter, or strongly gummed water. It is then laid on with a fine camel's hair brush. When the article to be gilded is made of soft porcelain, delftware, or any kind of earthenware with a plumbiferous glazing, nothing else is required than to apply the gold in this manner and then subject the piece of earthenware to a heat sufficient to soften the glazing, and thus fix the gilding. But in the case of hard porcelain, some kinds of stoneware and other varieties of pottery, in which the glazing does not soften at a suitable temperature, the gold powder, before being mixed with the viscous vehicle by which it is applied, must have a flux added to it, which serves as a means of attachment between the metal and the earthenware. The best flux is oxide of bismuth precipitated by water from a solution of nitric acid, with the addition of one-twelfth part of melted borax. One-tenth or one-fifteenth part of this flux is added for every part of gold contained in the mixture, which is applied to the surface of the earthenware. Heat is applied in the same way as in the previous case to melt the flux, and thus fix the layer of gold to the article. The gilding must finally be burnished in order to bring up the gold color. Another method of gilding these substances is to mix neutral chloride of platinum with rectified spirits of turpentine in such a manner that the chloride is held in suspension in a finely divided state in the turpentine, to apply this liquid to the article to be gilded by means of a brush, and then to subject the article to heat so as to volatilize the spirits of turpentine and leave a uniform layer of platinum affixed to the glass or earthenware. The article, after being cooled, cleaned with aqua fortis, and washed with water, is next dipped in a gilding liquid prepared like that already described as patented by Mr. Elkington. The gilding is completed by rubbing the gilt parts with chamois leather. This method of gilding has the advantage of enabling the gilder to dispense with the burnishing, which is a very hazardous operation for fragile articles, and in the case of those which are of a very intricate form or very deeply cut out often impracticable. For a description of the processes of electro gilding, see ELECTRO-METALLURGY.

Giles, Chauncey, an American author; born in Charlemont, Mass., May 11, 1813; entered the Swedenborgian Church in 1853, and held pastorates in Cincinnati, New York, and Philadelphia. Among his numerous works, many of which have been translated into French, German, and Italian, are: "The Magic Spectacles" (1868); "The Gate of Pearl" (1869); "The New Jerusalem" (1874); "The Valley of Diamonds, and Other Stories" (1881). He died in Philadelphia Nov. 6, 1893.

Giles, Henry, an American clergyman; born in Crokford, Ireland, Nov. 1, 1809; came to the United States in 1840. He wrote: "Christian Thought on Life" (1850); "Human Life in Shakespeare" (1868); and "Lectures and Essays on Irish and Other Subjects" (1869); etc. He died near Boston July 10, 1882.

Gildersleeve, Basil Lanneau, an American classical scholar; born in Charleston, S. C., Oct. 23, 1831; graduated at Princeton in 1849, and studied in Germany for several years. He was Professor of Greek and Latin at the University of Virginia from 1856 to 1876, when he was appointed Professor of Greek at Johns Hopkins University. He is the founder and editor of the "American Journal of Philology." Among his works are: "Satires of Persius Flaccus" (1875); "Justin Martyr" (1875); "Odes of Pindar." He published a Latin grammar and "Essays and Studies."

Gilfillan, George, a Scotch author; born in Comrie, Perthshire, Jan. 30, 1813; studied at the University of Glasgow, and at the divinity hall of the Secession body, afterward the United Presbyterian Church; and in 1835 he was licensed to preach the Gospel. In 1836 he was ordained to the School Wynd Church, Dundee. Among his works are: "A Gallery of Literary Portraits" (1845–1854); "The Bards of the Bible" (1850; 7th ed. 1887); "The Mar-

tyrs of the Scottish Covenant" (1852); "History of a Man" (1856); "Alpha and Omega" (1860); "Night; a Poem" (1867); "Remoter Stars in the Church Sky" (1867); lives of Scott (1870), Dr. W. Anderson (1873), and Burns (1880); and "Sketches, Literary and Theological" (1881). In 1853 he commenced an edition of the "British Poets" in 48 volumes. He died in Arnhalt, Aug. 13, 1878.

Gilgal (gil'gal), an ancient city near the Jordan, where the Israelites passed the river into Caanan, where they were circumcised and held the first Passover after leaving the desert (Joshua iv: 19). Here rested the tabernacle, till removed to Shiloh; here Samuel held court as judge of Israel, and here Saul was crowned. It is frequently mentioned in the Bible; a school of the prophets was established here (II Kings iv: 38), yet it afterward became a seat of heathen worship (Amos iv: 4). Josephus places it within 2 miles of Jericho, but no traces of it are at this day extant.

Gilghit, or Gilgit (gil-git'), a valley and district in Kashmir, India, on the S. slope of the Hindu Kûsh, and watered by the Gilgit, or Yasm, a tributary of the Indus.

Gilia, a genus of plants. The tri-colored *Gilia* is a garden plant, one foot high, cultivated for the beauty of its flowers, which are numerous; limb pale lilac-blue colored, with purple throat and yellow tube.

Gills, the branchiæ of fishes; a double row of long, compressed, slender-pointed processes, extending, like the teeth of a comb, from the convex side of a branchial arch, and supported by a delicate membrane. Gills may be free or fixed. In *Myxinoids* there are only gill-sacs. In some osseous fishes, certain of the branchial arches support only one series of processes, called uniserial or half-gills; in most cases they have biserial or whole gills. Gills, as a rule, are pectinated; there are also, however, plicated and tufted gills. The main purpose of the gills is to expose the venous blood, in a state of minute subdivisions, to the influence of streams of water.

In entomology, hair or leaf-like processes projecting from the body of some aquatic insects, and containing one or more tracheæ, and their ramifications communicating with those of the body generally. Insects thus equipped do not need to rise to the surface of the water to breathe.

In botany, the lamellæ or parallel plates on the underpart of the pileus of an agaricus. They constitute the hymenium in which the spores lie.

Gill, David, a Scotch astronomer; born in Aberdeen, June 12, 1843; educated at Marischal College. He was chief of staff of Lord Lindsay's observatory, founded in 1870; in charge of Lindsay's expedition to Mauritius in 1874 to observe the transit of Venus and the opposition of Juno, by means of the heliometer, for the determination of the solar parallax. He determined the longitudes of Malta, Alexandria, Suez, Aden, Bombay, Seychelles, Reunion, Mauritius, and Rodriguez by cable and chronometers, and measured the first base-line for the Egyptian triangulation at the request of the khedive. In 1877 he was in charge of the expedition to Ascension to observe the opposition of Mars for parallax; and in 1879-1907 was director of the Cape Observatory. He was delegate to the International Astrophotographic Congress, and member of its permanent committee. Knighted in 1900.

Gill, Henry Z., an American physician; born in Richboro, Pa., Oct. 6, 1831; was graduated at Jefferson Medical College, Philadelphia, 1857; was a surgeon in the Union army during the Civil War; was Professor of Chemical and Operative Surgery in Wooster University in 1883-1886; removed to Kansas in 1886. His publications include "Report on the Prisons of the United States"; "Gill's Sanné on Diphtheria, Croup, and Trachiotomy." He died in 1907.

Gill, Theodore Nicholas, an American educator; born in New York city, March 21, 1837; received a common school education; studied natural history; and became Professor of Zoölogy in Columbian University in 1884. His publications include "Arrangement of the Families of Mollusks"; "Arrangement of the Families of Mammals"; "Catalogue of the Fishes of the East Coast of North America"; and "Scientific and Popular Views of Nature Contrasted."

Gillaroo, a variety of the common trout, in which the coats of the stomach are said to be thickened like the gizzard of birds by feeding on shell-fish.

Gille, Philippe (zhēl), a French dramatist; born in Paris, Dec. 18, 1834. He was originally a sculptor, and his work attracted attention. He has produced a variety of successful plays, "Gladiator's Thirty Millions," "Jean de Nevelle," and "My Comrade," are probably the best.

Gillespie, George, a Scotch clergyman; born in Kirkcaldy, Jan. 21, 1613; educated at St. Andrews, and early in 1638, after the power of the bishops had been pulled down, was ordained minister of Wemyss in Fife. He showed characteristic fearlessness at the Glasgow Assembly that same year, was translated to Edinburgh in 1642, and the year after was sent up, as one of Scotland's four representatives, to the Westminster Assembly, where his vigor, ability, and earnestness enabled him to take a great part in the pro-

tracted debates on Church discipline and dogma. His "Aaron's Rod Blossoming, or the Divine Ordinance of Church Government Vindicated" (1646), is admittedly a masterly statement of the high Presbyterian claim for full spiritual independence. In 1648 Gillespie was appointed moderator of the General Assembly. He died in Kirkcaldy, Dec. 17, 1648.

Gillette, William, an American playwright; born in Hartford, Conn., July 24, 1853. He is the author of several successful plays, in many of which he has assumed the leading parts. Among his best-known productions are: "The Professor" (1881); "Esmeralda" (1881), with Mrs. F. H. Burnett; "The Private Secretary"; "Held by the Enemy" (1886); "A Legal Wreck" (1888); "Too Much Johnson" (1895); and "Secret Service" (1896).

Gill Frame, or **Gill Head,** in flax-dressing, a machine in which stricks of flax are drawn out into slivers; doubled and combined with other slivers, and redrawn till they assume the character of rovings, and are ready for spinning. The name is derived from a number of vertical needles forming a comb, through which the line passes to the drawing-roller; the gill is attached to a fuller bar, which rises and falls at intervals and alternately detains and releases the line, which, by a series of operations, is converted from a strick to a sliver, and then to a roving.

Gillies, John, a Scotch historian; born in Brechin, Forfarshire, Jan. 18, 1747; educated at the University of Glasgow, and for several years acted as tutor to the sons of the Earl of Hopetoun. In 1778 he published a translation of the "Orations of Isocrates and Lysias, with Some Account of Their Lives," and in 1786, his principal work, the "History of Ancient Greece." His "View of the Reign of Frederick II. of Prussia" appeared in 1789. In 1793 he was appointed historiographer to the king for Scotland. He also published a translation of "Aristotle's Ethics and Politics" (1797), and of "Aristotle's Rhetoric" (1823), and a "History of the World from Alexander to Augustus" (1807–1810). He died in Clapham, Feb. 15, 1836.

Gilles, St. (san zhēl), a town in the department of Gard, France, 12 miles S. S. E. of Beaucaire. Its territory produces a strong red wine, which is exported.

Gilliesiaceæ (gil″lēz-i-ā′se-ē), in botany, gilliesiads, an order of exogens, alliance liliales. It consists of small herbaceous plants with tunicated bulbs. The leaves are grassy; the flowers, which are inconspicuous, are umbellate, surrounded by bracts, the outer petaloid and herbaceous, the inner colored; perianth minute; stamens six, three sometimes sterile; ovary superior, three-celled; style one, stigma simple; capsule three-celled, three-valved, many-seeded. They are found in Chile. Lindley enumerated two genera, and estimated the known species at five.

Gillingham, a town of Dorsetshire, England, on the Stour, 22 miles W. of Salisbury. Near it are the "Pen Pits," thought variously to be quarry holes or prehistoric dwellings.

Gillingite, a black, amorphous, often compact mineral; its hardness 3, specific gravity 3.04. Composition: Silica, 27.50 to 32.18; alumina, 0 to 5.50; sesquioxide of iron, 0 to 37.49; water, 11.75 to 20, etc. A variety of it is called thraulite.

Gillis, James Melvin, an American astronomer; born in Georgetown, D. C., Sept. 6, 1811; entered the navy in 1827, soon obtained leave of absence and was graduated at the University of Virginia, and then spent six months in Paris. He was in charge of the observation of occultations and transit observations made in connection with the Wilkes exploring expedition, Gillis making the observations at the Washington end at a little observatory on Capitol Hill. He had charge of the United States astronomical expedition to the Southern hemisphere, and in 1861 was appointed superintendent of the national observatory at Washington, D. C. He died in Washington, D. C., Feb. 9, 1865.

Gillis Land, polar land N. E. of Spitzbergen, first sighted in 1707 by Gillis, a Dutchman, in lat. 81° 30′ N. and lon. 36° E., but not visited by him. Some geographers identify it with King Charles or Wiche Land, one of the Spitzbergen group, situated in lat. 79° N., and between lon. 26° 30′ and 32° 30′ E.

Gillman, Henry, an American botanist; born in Kinsale, Ireland, Nov. 16, 1833; settled in Detroit, Mich., in 1850; was United States consul at Jerusalem in 1886–1891. During his consulate he so strongly opposed the Turkish government in its expulsion of Jews from Palestine that several European countries supported him, and the exclusion laws were modified. He is the author of "The Wild Flowers and Gardens of Jerusalem and Palestine"; etc.

Gillmore, Quincy Adams, an American military officer; born in Black River, Lorain co., O., Feb. 28, 1825; graduated at West Point in 1849. He was promoted captain in 1861, and Brigadier-General of volunteers early in 1862. He displayed skill as an engineer by the capture of Fort Pulaski in April, 1862, and was appointed commander of the Department of the South in June, 1863. He made a successful attack on Morris Island in July, 1863, began

to bombard Fort Sumter and Charleston in August, and took Fort Wagner in September; Fort Sumter was reduced to a ruinous condition, but its garrison continued to hold it till Feb. 17, 1865. General Gillmore commanded the 10th Corps near Richmond in 1864, and was brevetted Major-General U. S. A., in 1865. He died in Brooklyn, N. Y., April 7, 1888.

Gill Net, a net suspended in a stream, having meshes which allow the heads of the fish to pass, and which catch in the gills to prevent the fish from detaching itself.

Gillott, Joseph (jil′ot), an English manufacturer; born in Sheffield, Oct. 11, 1799; shares with Sir Josiah Mason the credit of having brought the manufacture of steel pens to its present state of high perfection. He died in Birmingham, Jan. 6, 1872.

Gill Sac, in ichthyology, one of the rudimentary gills constituted by sacs, occurring in the myxinoids and lampreys. A gill of the ordinary fishes is the homologue, not of a single gill sac, but of the continuous halves of two of them.

Gilman, Daniel Coit, an American educator; born in Norwich, Conn., July 6, 1831; was graduated at Yale College in 1852; Professor of Physical and Political Geography in Yale in 1856–1872; president of the University of California in 1872–1875. When Johns Hopkins University was founded in Baltimore, Md., in 1875, he was elected its first president and served in that capacity till 1901, when he resigned and became editor-in-chief of the "International Cyclopædia." In 1896-1897 he was a member of the commission to settle the boundary line between Venezuela and British Guiana; in the latter year also served on the commission to draft a new charter for Baltimore; and in 1901-1904 was the first president of the Carnegie Institution, Washington. His publications include "Life of James Monroe"; "University Problems"; "Introduction" to DeTocqueville's "Democracy in America"; etc. He died Oct. 13, 1908.

Gilman, Nicholas Paine, educator; born in Quincy, Ill., Dec. 21, 1849; was graduated at Harvard Divinity School in 1871; editor of the Boston "Literary World" in 1888–1895; then became Professor of Sociology and Ethics in the Meadville Theological School. His publications include "Profit-Sharing Between Employer and Employee"; "Socialism and the American Spirit"; etc.

Gilm zu Rosenegg, Hermann von (gilm tsö rō′zen-eg), a German poet; born in Innsbruck, Nov. 1, 1812; studied jurisprudence at the university in Innsbruck, and then began a career in the government service, rising to positions of responsibility by years of valuable service. Of liberal tendencies in religion and politics, and enthusiastic in the cause of the Tyrolese, he wrote "Sonnets from Tyrol" and "Songs of the Natter Maids," which achieved quick success. Other poems by him did much to maintain among the Tyrolese the spirit that prompted their uprising for independence in 1809. He died in Linz, May 31, 1864.

Gilolo, or **Jilolo** (jē-lō′lō), an island of the Molucca group in the Indian Archipelago; area, 6,500 square miles. It is of singular form, consisting of four peninsulas, radiating from a common center, and having large bays between. It is rugged and mountainous, the mountains being volcanic. The principal productions are sago, cocoanuts, spices, fruits, edible birds'-nests, useful timber; horses, cattle, and sheep. Deer, wild boars, and other game are likewise plentiful. The original inhabitants, called Alfoories, have been gradually pressed into the interior by the Malays.

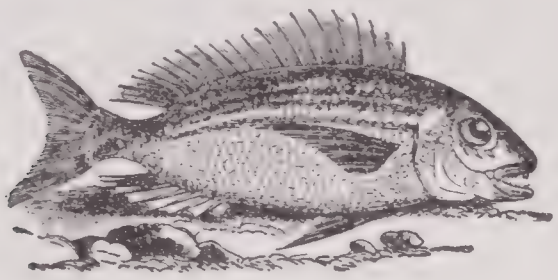
Gilpin, Bernard, the "Apostle of the North," an English clergyman; born in Kentmere Hall, in 1517; studied at Queen's College, Oxford. In 1552 he became vicar of Norton in the diocese of Durham, but resigned to pursue his studies at Louvain. Returning to England toward the close of Mary's reign, he was appointed by his uncle, Bishop Tunstall, to be archdeacon of Durham and rector of Easington. The see of Carlisle and the provostship of Queen's College, Oxford, were in turn offered him, but he refused both, preferring to spend the remainder of his life at Houghton in unceasing works of benevolence. Through Cecil he obtained a general license for preaching, and armed with this he regularly made preaching excursions into the wildest parts of Cumberland, Westmoreland, and Northumberland. He died in Houghton, March 4, 1583.

Gilpin, William, an English author; born in Carlisle in 1724; educated at Oxford, and kept a school at Cheam in Surrey. His name is remembered for a series of books on the scenery of various parts of Great Britain illustrated by aquatint engravings of his own execution. Of these the chief are "Observations on Picturesque Beauty in Several Parts of Great Britain, Particularly the Highlands of Scotland" (1778); "The River Wye and Southern Districts of Wales" (1782); "The Lake Country" (1789); "Forest Scenery" (1791); and "The Western Parts of England and Isle of Wight" (1798). He died in Boldre, Hampshire, in 1804.

Gilsonite, a species of asphalt found in Utah. This deposit yields a substance that can be used to paint the bottoms of ships and which will protect them from corrosion,

sea-weed, and barnacles to a remarkable degree.

Gilthead, a fish, *Chrysophrys aurata,* having golden colored eyebrows, whence its English name. The back is silvery gray shaded with blue, the belly polished steel-blue, with golden bands along the sides. Abundant in the Mediterranean, whence it



COMMON GILTHEAD.

extends in one direction to the shores of Great Britain, in the other to the Cape of Good Hope. It is of the family *Chætodontidæ.*

Also, a fish, *Crenilabrus melops* or *tinca;* called also the connor, or golden maid. Its upper parts are striped with red and green; the lower parts green with red spots. Found along the British coasts. It is of the family *Labridæ.*

Gimbal, Gimbol, or **Gimble,** a form of universal joint for securing free motion in suspension, or for suspending anything, as a lamp, a compass, or a chronometer, so that it may always retain a certain position or be in equilibrium. It generally consists of a pair of interlocked rings or hoops, moving the one within the other, and each perpendicularly to its plane, about two axes, at right angles to each other.

Gimp, silk twist interlaced with wire or a coarse cord. It is now principally used in upholstery, though it has at times been fashionable for trimming wearing apparel. The term is also used in pillow-lace making, signifying a thread thicker than ordinary, round which others are twined or woven.

Gin, a compounded spirit, prepared either by redistilling plain spirit with juniper berries, coriander seeds, angelica root, etc., or by adding various essential oils to rectified spirit. The gin produced by distilling possesses a much more delicate flavor than that produced by mixing or compounding. The strength of gin varies from proof to 50 under proof.

In machinery, a portable hoisting machine whose frame is a tripod, one leg being movable so as to vary its angle of elevation, and thus determine the height of the apex; the other two legs preserve their relative distance, and form standards for the drum, round which the rope is wound by power applied to the handspikes. For heavy weights a fall and tackle is used; and for hoisting a bucket from a well or mine, simply a couple of pulleys to change the direction of motion of the rope. One pulley is suspended from the apex, and the other attached between the two permanent legs, so as to change the rope to a horizontal position, for the attachment of a draught horse. Also, a machine for separating cotton fiber from the seeds. See COTTON-GIN.

Ginckell, Godart van (ging'kel), a Dutch military officer; born in Utrecht about 1630, accompanied William III. to England in 1688. Along with his master he crossed over to Ireland in 1690, and commanded a body of horse at the battle of the Boyne. On the king's return, Ginckell was left as commander-in-chief in Ireland. He thereupon reduced Ballymore and Athlone, defeated St. Ruth at Aghrim, and finally captured Limerick. For this he was in 1692 created Earl of Athlone. He afterward commanded the Dutch troops under Marlborough in the Low Countries. He died in Utrecht, Feb. 10, 1703.

Ginevra, a young Italian bride, who hid in a trunk with a spring lock. The lid fell on her, and she was never discovered till the body had become a skeleton.

Gingal (jing'gâl), an East Indian breech-loading firearm, carrying a ball from four to eight ounces. It is fired from a rest.

Gingee (jin'jē), a town of Hindustan, in the Carnatic, 80 miles from Madras, on the Coromandel coast. It stands on a stupendous rock, and was formerly regarded as impregnable. It was taken by the French in 1750, and abandoned to the British after the capture of Pondicherry in 1761.

Ginger, in botany, *Zingiber officinale,* common or narrow-leaved ginger. It has subsessile linear lanceolate smooth leaves, oblong spikes, acute bracts, and a three-lobed lip. It is a native of India, but is cultivated in most tropical countries. There is a broad-leaved ginger, *Z. zerumbet,* also a native of India. It is used externally for cataplasms and fomentations, but is not eaten.

In ordinary language, the dry, wrinkled rhizomes of the ginger-plant. The pieces, or as they are called races, are usually from 2 to 4 inches long, branched, flat, and of a pale buff color. Ginger is known in commerce under two forms, coated and uncoated or scraped, the latter having been deprived of its epidermis when in the green state, and sold as white ginger. The chief varieties imported into the United States are Jamaica, Cochin, Bengal, Japan, and African. The first three are scraped gingers, and of these Jamaica is the most esteemed owing to its color and flavor. Some kinds of ginger are bleached with chloride of lime, while others are simply coated with chalk to give them a whiter appearance.

Ginger is an agreeable aromatic, and a valuable stomachic; but is more largely used as a condiment than as a medicine. Preserved ginger, so largely imported from China in jars, consists of the young rhizomes boiled in syrup. Ground ginger is frequently adulterated, the chief adulterants being sago flour, wheat flour, ground rice, and arrowroot. These are added, not only to increase the weight but to whiten a dark-colored variety, which is then sold as a first-class ginger. All these substances can be readily detected by the miscroscope.

Ginger Beer. The following is one of several recipes for the manufacture of this beverage: Boil 1½ pound of bruised Jamaica ginger in 3 gallons of water for half an hour; then add from 18 to 24 pounds of good white sugar, 1 quart of lemon or lime juice (instead of which may be used, though not so well, 4 ounces of cream of tartar or tartaric acid), and 1 or 2 pounds of the finest strained honey, along with 15¼ additional gallons of water. Next strain the mixture, and when the liquor has become almost cold add the white of an egg, and ½ fluid ounce of essence of lemon, then strongly agitate the vessel for about half an hour. Allow the whole to stand fermenting from three to six days, according to the state of the weather, then bottle. A kind of ginger beer may be expeditiously made by pouring a gallon of boiling water over ¾ pound of loaf-sugar, 1¼ ounces of sliced ginger, and the peel of one lemon, and after allowing the mixture to cool till it is milk-warm adding the juice of a lemon and a spoonful of yeast. Ginger beer powders may be made of the following constituents: 5 ounces white sugar, 1½ ounces tartaric acid, 1½ ounces carbonate of soda, 2 drachms powdered Jamaica ginger, and 10 drops of essence of lemon. If all the materials are mixed together in the process of manufacture, then it is necessary to see that they are carefully dried before mixing, mixed while still warm, in a warm mortar, and immediately bottled. If the acid and the carbonate of soda are kept separate, it is unnecessary to take these precautions.

Gingile Oil, a name often given to the bland fixed oil obtained by expression from the seeds of *Sesamum Indicum*. See SESAME.

Gingko, the Japanese name of a coniferous tree of the yew alliance, with very characteristic leaves, in form and variation recalling the leaflets of the maiden-hair ferns. The yellow, drupe-like seeds reach the size of a walnut, and are largely eaten throughout China and Japan. The Japanese esteemed the tree as sacred, and planted it round their temples. The tree is diœcious, but the Chinese sometimes plant several male and female trees close together, so that male and female flowers appear to arise on the same tree.

Ginsburg, Christian D. (gins-börg), a Polish author; born in Warsaw, in 1830. He is the author of "Historical and Critical Commentary on the Song of Songs"; "The Karaites, Their History and Literature"; "The Essenes"; "The Kabbalah, Its Doctrines, Development and Literature," and other works of similar character. His greatest work is, however, the "Massora." He was one of the scholars engaged on the revised version of the Old Testament.

Ginseng (Chinese *Gensen*, "that which resembles a man"), a root used in China as a medicine. It is the root of a species of *Panax* (order *Araliaceæ*). *P. Ginseng* of Chinese Tartary is similar to *P. quinquefolium* of North America, which is exported to China to the amount of about 500,000 pounds annually. The ginseng of Korea is most valued, and is carefully cultivated in that country. Ordinary ginseng is prepared by simply drying the root over a charcoal fire; the red or clarified ginseng is steamed in earthenware vessels with holes. The root is mucilaginous, sweetish, also slightly bitter and aromatic.

Gioberti, Vincenzo (jō-ber'tē), an Italian writer; born in Turin, April 5, 1801; was ordained priest in 1825, and soon afterward was appointed court chaplain at Turin. He was banished in 1833 on account of his liberal tendencies, remaining a few years in France, where he began to teach philosophy in a public school at Brussels. His first writings were philosophical "The Theory of the Supernatural" (1837); the "Introduction of High Philosophical Research" (1840), following out the subject of the former treatise, and combating the principles of Kant and Victor Cousin in favor of the doctrines of St. Thomas Aquinas and St. Buonaventura; three volumes more in 1842, entitled "Philosophical Errors of Antonio Rosmini"; and next the treatises "The Beautiful" and "The Good," on the principles, respectively, of taste and morals. In 1843 appeared the most celebrated of his works, "Moral and Civil Principles of the Italians"; in which the moral and civil preëminence of Italy over all the nations of the earth is set forth, and the success of which was exemplified in the Italian frenzy for the early reforms of Pius IX., and the enthusiasm that led to the revolution of 1848. In that year Gioberti was recalled to his native country amid popular acclamation. On the proclamation of the Sardinian constitution he was elected deputy for Turin, took an active part in all the great political questions then agitating Europe, and finally became prime-minister of Sardinia. In 1849 he returned into voluntary exile, and spent his last years in Paris

in writing his "The Civil Renovation of Italy." He died in Paris, Oct. 26, 1852.

Giobertine Tincture, a preparation for restoring illegible writings or faded pictures. The inventor of it was Giovanni Antonio Gioberti, a native of Piedmont.

Gioja, Flavio (jō'yä), an Italian mariner; born in Pasitano, near Amalfi, the latter part of the 13th century. Gioja is said to be the inventor of the mariner's compass, of which he made use in 1302–1303. He marked the N. with a fleur-de-lis, in honor of the sovereigns of Naples, a branch of the royal family of France. The tendency of the loadstone to turn toward the N. was known before his day, but the compass then in use consisted only of a magnetized reed floating upon cork in a vessel of water. Gioja invented the plan of suspending it on a pivot, thus leaving it free to move in any direction, whereby observations were rendered both easier and more exact.

Giordano, Luca (jōr-dä-nō), an Italian painter; born in Naples about 1632; a scholar of Spagnoletto, studied the great Italian masters at Rome, and became the pupil of Peter of Cortona. He imitated the greatest masters so well that even connoisseurs were imposed upon. In 1679 he was employed by Charles II. to ornament the Escurial, and at the court of Spain he became a great favorite. Giordano was especially successful in imitating the manner of Bassano, and of the Chevalier Massimo Stanzioni. After the death of Charles II. he returned to his native country. His most celebrated pieces are his frescoes, in the Escurial, at Madrid, Florence, and Rome. Some of his finest paintings are at Dresden. He died in Naples, Jan. 12, 1705.

Giorgione, Giorgio Barbarelli (jōr-jō'ne), an Italian painter; born in Constelfranco about 1477. Several of his oil-paintings have been preserved, and are at once recognizable by the firmness of touch, vividness of coloring, and the striking tone of relief which they display. The Museum at Paris contains four of his works, viz: "Salome receiving the Head of John the Baptist"; "Jesus Sitting on His Mother's Knees"; "The Rural Concert"; and "Gaston de Foix." His *chef d'œuvre* is a picture of "Christ Carrying His Cross," preserved at Venice. He died in Venice in 1511.

Giotto (jot'tō), properly **Ambrogiotto** or **Angiolotto Bondone,** an Italian painter; born in Vespigano in 1266;and in his boyhood tended cattle. But having been seen by Cimabue, as he was drawing figures of his sheep upon a piece of slate, that artist carried him to Florence and taught him painting. He represented human figures with truth and nature, and surpassed all others in the dignity and pleasing arrangement of his figures, and a regard to the proportions and disposition of the drapery. His figures have more life and freedom than those of Cimabue, as he particularly avoided the stiff style. Among his most celebrated pieces is the "Navicella" at Rome, a picture of Peter walking upon the waves, some fresco paintings at Florence, also the history of St. Francis, at Assisi, and several miniatures. He was equally successful as a sculptor and architect. He died in Florence in 1336.

Giovannini, Girolamo. See FIRENZUOLA, AGNOLO.

Gipsies (from Egyptians, the name by which they were called in the English statutes), a wandering nation whose physical characteristics, language, and customs differ much from those of European nations. They are called by the French Bohémiens, from the belief that they were Hussites driven from their country; in Switzerland, the Netherlands, and the Black Forest they go under the name of Heiden (Pagans); in North Germany, Denmark, and Sweden they are called Tatern (Tartars). The name they most frequently pass under in Germany is Zigeuner, which is not unlike the Italian Zingaro or Zingano, the Spanish Zincalo or Gitano, the Hungarian Cigán, the Turkish Tschinganeh. They call themselves Romani or Romanitchave, from *rom* (man) and *tchave* (children). The number of gipsies in Europe is roughly set at perhaps 700,000. Of this number about 200,000 are in Rumania, 95,000 in Austria-Hungary, 120,000 in European Turkey; 40,000 in Spain; 40,000 spread over Germany, France, and Italy; 18,000 in Great Britain; and the remainder scattered over other countries. As their English name denotes, the gipsies were for a long time believed to have come from Egypt, but it is now satisfactorily ascertained that they are of Indian origin, and it is probable that their own name of Sinte or Sinde corresponds to the Sanskrit Sain-dhavas, or dwellers on the Indus. The main body of their language is the same throughout Europe, and even now has a close affinity with the dialects of Hindustan, though it is mixed with a great number of words and expressions borrowed from the rac s among whom they have sojourned.

Gipsies are remarkable for the yellow brown, or rather olive color, of their skin; the jet-black of their hair and eyes, the extreme whiteness of their teeth, and for the symmetry of their limbs, which distinguishes even the men, whose general appearance, however, is repulsive and shy. The gipsies have much elasticity and quickness; they are seldom of a tall or powerful frame; their physiognomy denotes carelessness and levity. They rarely settle permanently anywhere. Wherever the climate is mild enough they are found living in forests and waste places in companies. They live in

tents and seek shelter from the cold of winter in grottoes and caves, or they build huts sunk some feet in the earth, and covered with sods laid on poles. In some countries, however, members of the race may be found who follow a settled trade. Thus they are inn-keepers, horse doctors, and dealers in horses; they are smiths, mend old pans and kettles, and make iron utensils, nails and the like. Some work in wood, making spoons, spindles, troughs, or they assist the farmer in the fields. Their talent for music has been remarked, but it is confined to instrumental music, which they chiefly practise by the ear. They play on the violin, Jew's-harp, the bugle, flute, and hautboy. Their music for dancing is lively and expressive; there are no better musicians for the Hungarian and Polish national dances. Some of their melodies have become the much-valued property of other nations, or are incorporated in some of our favorite operas. The gipsies who formerly traversed Germany supported themselves by tricks, the women telling fortunes with cards; the men dancing on the rope and performing similar feats. The gipsy women in their younger years, particularly in Spain, are dancers. When older they invariably practise fortune-telling and chiromancy. This is their chief occupation in all parts of Europe.

There is no special costume to distinguish the gipsy. In warm countries the children may go perfectly naked for some years. In England the women often have red cloaks with hoods, and generally a handkerchief tied over the head. They are fond of rings and ornaments. Those gipsies who lead a settled life are very fond of dress. Their domestic animals are horses and pigs. In England they have always donkeys in their caravans. They are fond of onions and garlic according to the Oriental custom. They eat all kinds of flesh, even that of animals which have died a natural death. Toward the end of the 18th century they were accused in Hungary of having slaughtered human beings and devoured them, and in consequence of this charge were treated with the greatest severity. Their guilt, however, has never been proved. Brandy is their favorite beverage; tobacco their greatest luxury; both men and women chew and smoke it with avidity, and are ready to make great sacrifices for the sake of satisfying this inclination. They have no peculiar religion. Among the Turks they are Mohammedans; and in Christian countries they follow the forms of the Christian religion, whether Roman Catholic or Protestant, without, however, caring for instruction or having any interest in the spirit of religion. In Transylvania they often have their children baptized repeatedly at different places, for the sake of the money which it is customary in that country for

the god-father to give to the poor parents of his god-child. Marriages often take place in church, but at other times they may be celebrated with rites or ceremonies of the simplest kind, often at the age of 14 or 15 years. In Hungary another gipsy may officiate as priest at the wedding. A gipsy will seldom marry any but one of his race. If he becomes tired of his wife, he will turn her off without ceremony. A gipsy woman sometimes marries a man of another race.

It has been repeatedly proposed to banish this people from Europe. In France and Spain, in Italy and Germany, laws were passed against them in the 16th century. But even persecutions were of little avail toward rooting them out. They always appeared again in the Southern countries. As they are very numerous in the Austrian States, and have a kind of constitution there among themselves, being in a manner governed by chief gipsies or *voivodes*, the great Maria Theresa formed the plan of converting them into orderly men and citizens. In 1768 she issued an ordinance that in future gipsies should dwell in settled habitations, practise some trade, dress their children, and send them to school. Many of their disgusting customs were prohibited, and it was ordered that they should forthwith be called *Neubauern* (new peasants). This ordinance remaining ineffectual, recourse was had in 1773 to severe measures; the children were taken from their parents and brought up in Christian principles. But as little was effected in this way as by the very mild measures adopted by the Russian government. However, the ordinances of Joseph II. (1782 *et seq.*), to forward the improvement of the gipsies in Hungary, Transylvania, and the Banat, have not been without effect.

With regard to their language, a large number of the words are of Indian origin as already mentioned. They are found in part with little variation, in the Sanskrit, in the Malabar, and Bengal languages, and many words have been adopted from the different nations among whom they reside. Bishop Heber relates in his "Narrative of a Journey through the Upper Provinces of India, etc." (London, 1828), that he met with a camp of gipsies on the banks of the Ganges, who spoke the Hindu language as their mother tongue. Heber found the same people in Persia and Russia. Their grammar is also Oriental, and corresponds with the Indian dialects. The similarity cannot be considered the work of chance, particularly as their persons and customs show much of the Hindu character. It has even been attempted to derive their origin from a particular caste.

In 1417 the first mention is made of the gipsies in Germany. They appear to have come from Moldavia into Germany and

Italy. At that time they already wandered about in hordes with a commander at their head. In 1418 the number which entered Italy alone was estimated at 14,000 men. There were many in Paris in 1429. They were first believed to be pilgrims coming from the Holy Land; they were consequently not only unmolested but they received letters of protection. It is known, however, that in later times they were very expert in counterfeiting notes and similar documents. What may have been the cause of their leaving their country is not known; but very probably they were induced to flee from the cruelties exercised by Tamerlane.

Gipsy Winch, a small winch, having a drum, ratchet, and pawl; it may be fastened to a post. The handle of the winch is attached by stirrups to a cap revolving on the axis. Two motions can be applied to the winch, the ordinary rotary method of working the handle, and a reciprocating motion, in which the handle is worked up and down like a pump handle.

Giraffe, the camelopard, *Camelopardalis giraffa*. It has an affinity to the camel; but its resemblance to the leopard, which is only in its color and spots, is an analogy and no more. It has two small frontal horns and one central horn. The neck is very long, but has only the normal number of cervical vertebræ. The tongue is long and prehensile, and is used for stripping leaves off trees. The forelegs are very long, making the animal stand 15 to 18 feet high. It lives in small herds, and gallops in a ludicrously clumsy manner. The animal is inoffensive when unmolested, but will try to kick its assailant if it be attacked. Its flesh is good; when old it becomes coarse; the hide makes excellent leather. It is found in Nubia, Abyssinia, and the Cape of Good Hope; probably also in every part of the intermediate region. Species of giraffe have been found in Miocene strata in India, Greece, and France.

GIRAFFE.

Giraldus Cambrensis (ji-ral'dus kambren'sis), or **Gerald de Barry,** an English writer; born in Manorbeer, near Pembroke, Wales, in 1146. He was appointed to several rich benefices under Henry II. and Richard I., and administered the bishopric of St. David's, which he vainly endeavored to obtain for himself. When Richard Cœur-de-Lion was setting out on his crusade, he was named governor of the kingdom in his absence. His principal works are "The Topography of Ireland"; and "Travels in Wales." He died in St. David's in 1220.

Girard, Stephen, an American philanthropist; was born near Bordeaux, France, May 24, 1750. In 1769 he settled as a trader in Philadelphia, where he established the Second National Bank, and advanced several millions to the United States treasury during the War of 1812. In the yellow fever epidemic in 1793 he nursed many of the sick in the hospitals; and in public matters his generosity was remarkable. Among other bequests he left $2,000,000 for the erection and maintenance in Philadelphia of a college for male white orphans. He died in Philadelphia, Pa., Dec. 26, 1831.

Girard College, an institution in Philadelphia, Pa., for the education of poor white orphan boys; founded under the will of Stephen Girard, and opened Jan. 1, 1848. By a provision in the will no ecclesiastic, missionary, or minister of any sect whatever is to have any connection with the college. It has productive funds aggregating about $23,800,000; grounds and buildings valued at over $3,350,000; volumes in the library, about 17,000; income from all sources, over $1,000,000; average number of faculty, 70; students, 1,700; graduates, over 6,500.

Girardin, Emile de (zhē-rär-dan'), a French politician; born in Paris, June 22, 1806, and educated there. He bore the name of Delamothe till 1827, when he assumed that of his father, who acknowledged him in 1847; and his first attempt in literature was a novel, "Émile," in which he pleaded the cause of adulterine children. After the July revolution of 1830 he established the "Journal des Connaissances Utiles," and in 1836 he founded the "Presse," an Orleanist journal with Conservative leanings. Its rivals accused it of being subsidized by the government, and one of the unfortunate results of the quarrels thus fastened on Girardin was his duel with Armand Carrel, editor of the "Na-

tional," in which the latter fell. He promoted Louis Napoleon's election to the presidency, and afterward became a Socialist. In 1856 he sold his share of the "Presse," but became its editor again in 1862, eventually abandoning it for the direction of the "Liberté," which he maintained till 1870. He excelled his fellows in braggadocio on the outbreak of the Franco-Prussian war; and during the Commune he proposed a scheme for splitting up the republic into 15 federal states. In 1874, however, he founded the "France," and both in its pages and in the "Petit Journal" supported the republic. He wrote a few pieces for the stage; his political ideas he gave to the world in a host of brochures. He died in Paris, April 27, 1881.

Girardin, François Saint-Marc, a French journalist; born in Paris, Feb. 12, 1801; studied at the Collége Henri IV., and in 1827 obtained a mastership in the Collége Louis-le-Grand. After two visits to Germany he published a report on the state of education there, and "Political and Literary Notes on Germany"; in 1834 he was called to the chair of literature at the Sorbonne, and became leader-writer for the "Journal des Débats," distinguishing himself under the July monarchy as a ready combatant and resolute enemy to the dynastic and democratic opposition. He was elected a member of the Academy in 1844. His parliamentary career in 1834–1848 was not noteworthy; and under the Second Empire he retained his chair at the Sorbonne, where his lectures, following the orthodox lines of criticism, were very popular. He became a member of the National Assembly in 1871. Besides his numerous contributions to the "Débats," some collected in "Literary Essays" (1845); he published several large works, among them his "Course in Dramatic Literature" (1843), being his 63 lectures for a period of 20 years, and "Political Souvenirs and Reflections of a Journalist" (1859). He died in Paris, April 11, 1873.

Girardin, Marie Alfred Jules de, a French author; born Jan. 4, 1832. He was attached to the Lyceum of Versailles and at Loches; contributed stories to the "European Review," the "Revue des Deux Mondes," "Paris Illustré," and other French periodicals. Among his works are: "Brave Men" (1874), crowned by the Academy; "Uncle Placide" (1878); "The Captain's Niece"; "Grandfather" (1880), crowned by the Academy; "The Gaudry Family" (1884); "The Second Violin" (1887); and translations. He died in Paris, October 26, 1888.

Girasol (jir'a-sōl), a precious stone, exhibiting in strong lights a peculiar and beautiful reflection of bright red or yellow light, which seems to come from the interior of the stone. There are different kinds of girasol, variously referred by mineralogists to quartz and opal, species which, however, are very nearly allied. One kind is also known as fire opal, which is found only at Zimapan, in Mexico, and in the Faroe Islands. The Mexican specimens are of a rich topaz yellow color, and the reflection is very bright. Another kind is the quartz resinite of Haüy, so called because of its characteristic resinous fracture. It is found of various colors, sometimes of a fine yellow or emerald green, more generally bluish-white. The ancients held this stone in high estimation and called it asteria. The name girasol is sometimes given to a kind of sapphire, also called asteria sapphire, exhibiting a similar reflection of light, and sometimes to sunstone, an avanturine felspar.

Giraud, Count Giovanni (zhē-rō'), an Italian comedy-writer; born in Rome, Oct. 28, 1776. He was bred to the profession of arms, but relieved the monotony of the camp by writing comedies. They were produced with immense success in Venice, and admired by Napoleon, who gave him an important theatrical post; but on Napoleon's overthrow he entered mercantile life. As a playwright he makes Molière his model. "The Embarrassed Governor," "The Prophesying Fanatic," and "The Discontented Capricious One," are good examples of his talent as a contriver of ludicrous situations, helped out by witty dialogue. He died in Naples, Oct. 1, 1834.

Girder, a beam, of wood or metal, spanning the distance from wall to wall or pier to pier, and used to support a superstructure or superincumbent weight, as a floor, the pathway of a bridge, etc. Girders are often compound, the timbers being scarfed together and stayed by truss-work, or fished at the joint. The ends of the girder rest on the wall or pier to an extent varying according to the span: thus for a girder of 10 foot span, the bearing at each end should be 7 inches; for a 20 foot span, 14 inches. The ends rest on templates. Girders are of various sorts, according to the purpose for which they are required. A sandwich girder is one which is composed of two wooden beams with an iron flitch plate between, all bolted together.

Girder Bridge, a bridge supported by beams resting upon abutments; the beam is usually compound as a truss-bridge. See BRIDGE.

Girdle of Venus, an animal belonging to the actinozoa, found in the Mediterranean. In shape it resembles a ribbon, and it is apparently propelled by the cilia which fringe its edge. The mouth is situated on

the inferior edge. It is iridescent by day, and brilliantly phosphorescent at night.

Girdler, an American longicorn beetle, *Oncideres cingulatus*, which deposits its eggs in twigs of hickory and then girdles the twigs, thus killing them and rendering them fit food for their larvæ.

Girgashites, a tribe of the ancient Canaanites.

Girgeh (jēr'je), a town of Egypt, on the Nile, 10½ miles N. of the ancient Abydus. It was here that the discontented Mamelukes rallied against Mehemet Ali. Outside the town is a Roman Catholic monastery, said to be the oldest in Egypt.

Girgenti (jēr-jen'tē), a town of Sicily, near the site of the ancient Agrigentum, on the S. coast, 84 miles S. S. E. of Palermo. The town is the seat of a bishop and of the prefect and other officials of the province, and has a trade in grain, oil, fruit, sulphur, sumach, salt, and fish. Its port is Porto Empedocle. Pop. (1901) 25,024.

Girnar (gir-när'), a sacred mountain in India, in the peninsula of Kathiawar, Bombay province, 10 miles E. of Junagarh. It is a bare and black rock of granite rising to the height of 3,500 feet above the sea; and, as a holy place of Jainism, is covered with ruined temples. One group contains 16 temples, nearly 3,000 feet above the sea.

Girndt, Otto (gērnt), a German dramatist; born in Landsberg on the Warthe, Feb. 6, 1835. His profession was law; but the vogue of his comedy "Y 1," turned him toward the stage, in which he has won great popularity. "Cæsar Borgia," and "Charlotte Corday," dramas; "Oriental Entanglements," a comedy that won a prize, and "Dankelman," a tragedy, merit special mention. His stories are graceful and replete with incident, though they do not rank high; the best of them, "The Rescue of the King," and "Jolly Company," are fair specimens of a lively style.

Girodet, Anne Louis (zhē-rō-dā'), a French painter; born in Montargis, Jan. 5, 1767; was a pupil of David. Among his principal works are "Endymion Sleeping"; "A Scene from the Deluge"; the "Burial of Atala." He also painted "Napoleon Receiving the Keys of Vienna"; full-length portraits of the Vendean leaders, Bonchamp and Catnelineau; and "St. Louis in Egypt," which was his last great work. He was a member of the Academy of Painting, and of the Institute. He died in Paris, Dec. 19, 1824.

Gironde (zhē-rônd'), a maritime department in France; formed of part of the old province of Guienne; area, 3,761 square miles; capital, Bordeaux. It is watered mainly by the Garonne and the Dordogne, and by the Gironde, the estuary formed by the union of these two rivers. The E. two-thirds of the surface consists of a fertile hill and dale region; the remainder, in the W. next the ocean, belongs to the Landes. In the E. and N. E. the soil is chiefly calcareous. Wine is the staple product of the department, several million gallons being produced annually. Grain, vegetables, potatoes, pulse, and fruit are grown largely. On the downs or sandhills of the W. coast there are extensive plantations of pine, from which turpentine, pitch, and charcoal are obtained. The shepherds used to traverse the Landes on high stilts, and travel with them also to markets and fairs. The principal manufactures are salt, sugar, wax candles, porcelain and glass, chemical products, paper, and tobacco. Pop. (1906) 823,925.

Girondist (ji-ron'dist), or **Girondin** (-ron'din); the name of a great political party in France; one of the most powerful factors in the earlier part of the first French Revolution. When the Legislative Assembly met in 1791, it was found to contain representatives of the upper, the middle, and the lower classes. The Girondists were the party of the middle classes, and were republican in sentiment. They obtained their designation from the fact that their most celebrated leaders, Vergniaud, Guadet, and Gensonné, were members for the department of the Gironde, originally lawyers in the law court of Bordeaux. Their followers were the burgess class, the professionals, and the smaller agriculturists. In 1791 they were the most powerful party in the Assembly, and for a time shaped the policy of their country. When conservative Europe, in the interests of monarchy, threatened France with invasion, it was the Girondists who, in April, 1792, declared war, the Jacobins deprecating hostilities, as fearing the result. To overcome their monarchic rivals, the Girondists coquetted with the last-named party, and found that they had gained, not a servant, but a cruel and exacting master. The quarrel between the two arose after the massacres perpetrated in August and September, 1792, and the extreme revolutionists ultimately prevailing, an armed mob on May 31, 1793, assailed the Convention, and demanded the imprisonment of 29 Girondist deputies. These were arrested on June 2, and 21 of them were guillotined on Oct. 31. Others were subsequently put to death; a few escaping, reappeared in the Convention after the fall of Robespierre.

Girtin, Thomas, an English painter; born in Southwark, Feb. 18, 1775. He was a close friend and fellow-student of Turner; and to them many improvements in water-color painting are due. Girtin struck out a bolder style than had been attempted,

attained great richness of color and breadth, but was somewhat careless of detail, and sometimes inaccurate in drawing. His best works are panoramic views of London and of Paris. He died in London, Nov. 9, 1802.

Girtline, a whip purchase, depending from a lower mast head, and used in hoisting the rigging and gear of a mast.

Girton College, a noted college for women in England, instituted at Hitchin in 1869, but removed to Girton, near Cambridge, in 1873. Instruction is given in divinity, modern languages, classics, mathematics, moral science, natural science, including physiology and chemistry, history, and vocal music. There were in 1898, 29 lecturers, mostly connected with Cambridge University. The mistress and five resident lecturers were ladies. The students, 110 in number, are admitted after an entrance examination; the ordinary course extends over three years, half of each year being spent in college. Degree certificates are granted to those who satisfy their examiners as to their proficiency according to the standard of the examinations for the B. A. of Cambridge University.

Gisecke, Nikolaus Dietrich (gēs'ek-e), a German poet; born in Csó, Hungary, April 2, 1724; settled early in Hamburg, where he formed one of a little literary circle. He was a clergyman, and his sermons contain elegant diction; but his literary position is due wholly to a volume of poems, simple and unaffected in style. He died in Sondershausen, Feb. 23, 1765.

Giseke, Robert (gē'ze-ke), a German dramatist, great-grandson of Nikolaus; born in Marienwerder, Jan. 15, 1827. Early an accomplished theologian and an authority on philosophy and history, his prospects were destroyed by his political utterances in 1848, and he was driven to journalism for a livelihood. After some years he began to write novels, of which the best is perhaps "Otto Ludwig Brook." But his original and striking plays gave him his greatest renown; notably "The Two Cagliostros," "Lucifer, or the Demagogues," "The Elector Maurice of Saxony," and "A Burgomaster of Berlin." He died in Leubus, Dec. 12, 1890.

Gismondite (jis-mond'īt), or **Gismondine** (-in), an orthorhombic transparent or translucent mineral of splendent luster, its hardness 4.5; specific gravity 2.27; sometimes colorless, sometimes white, bluish-white, grayish or reddish. It is optically biaxial. Composition: Silica, 35.38; alumina, 27.23; lime, 13.12; potassa, 2.85, and water, 21.10. Occurs in leucitic lava near Rome and in Sicily.

Gisors (zhē-zōr'), a town in the French department of Eure, on the Epte, 43 miles N. W. of Paris. Its double-aisled church, whose choir dates from the 13th century, has a splendid flamboyant portal; and the octagonal donjon of the ruined castle was built by Henry I. of England. Here Richard I. defeated the French in 1198; his watchword, "*Dieu et mon Droit*," has ever since been the motto of the royal arms of England. Pop. (1901) 4,378.

Gissing, George, an English novelist; born in Wakefield in 1857. He has made a remarkable study of the London masses, from the ranks of skilled labor to the most noisome human refuse of the slums, the result being half repulsive and wholly powerful; particularly in "The Nether World," "New Grub Street," "Demos," and "Sleeping Fires." He died Dec. 28, 1903.

Githago (gi-thā'gō), a genus of *Caryophyllaceæ*, tribe *Sileneæ*. Calyx coriaceous, with foliaceous teeth, petals without scales at the base of the blade, entire. Styles and carpels opposite the sepals. Generally called *Agrostemma githago*, the corn cockle, common in English cornfields, but according to Watson a colonist. The flowers are large, purple, and resemble those of the red campion.

Gitschin (gich'in), a town of Bohemia, 60 miles N. E. of Prague. Gitschin was once the capital of the duchy of Friedland, and here Wallenstein built a splendid palace in 1630. On June 29, 1866, the Austrians were severely defeated here by the Prussians.

Gittith, an instrument of music among the ancient Hebrews. Buxtory calls it a stringed instrument, and derives the name from Gath, a city of the Philistines, whence King David, on his return, brought it to Jerusalem. Ps. viii, lxxxi, and lxxxiv, contain the name in their titles, and are supposed to have been specially composed for performance on this instrument.

Giugliano, San (sän jöl-yä'nō), a town of Southern Italy, in the Val di Mazzara, 5 miles N. E. of Trapani. On an adjacent hill are the ruins of the temple of Venus, celebrated by Vergil and Polybius.

Giulio Romano (jö'lē-ō rō-mä'no), properly GIULIO PIPPI DE' GIANNUZZI, an Italian artist; born in Rome about 1492; assisted Raphael in the execution of several of his finest works, such as the series of the so-called Raphael's Bible in the loggie of the Vatican and the "Benefactors of the Church" in the Incendio del Borgo, and at Raphael's death he completed the "Battle of Constantine" and the "Apparition of the Cross" in the Hall of Constantine in the Vatican. He built the Villa Madama, and adorned it with a fresco of Polyphemus. In 1524 Giulio accepted the invitation of Federigo Gonzaga, Duke of Mantua, to carry out a series of architectural and pictorial works, and restored the Palazzo del Te,

the cathedral, the streets, and a ducal palace at Marmirolo, a few miles from Mantua. Among the pictorial works of this period were the "History of Troy," in the castle, and "Psyche," "Icarus," and the "Titans," in the Te palace. In Bologna he designed the façade of the Church of St. Petronio. Perhaps the best of his oil pictures are the "Martyrdom of St. Stephen," at Genoa; "A Holy Family" at Dresden; "Mary and Jesus" and the "Madonna della Gatta." Giulio died in Mantua Nov. 1, 1546.

Giurgevo (jö-jā′vō), a town of Rumania, on the Danube, opposite Rustchuk, 40 miles S. S. W. of Bucharest, of which town it is the port. It imports iron and textile goods, coal, and spirits, and exports corn, salt, and petroleum. It was originally settled by the Genoese in the 14th century, who called it St. George. Since 1771 the town has played an important part in all the wars between the Turks and the Russians.

Giusti, Giuseppe (jös′tē), an Italian poet; born in Monsummano, near Pistoia, May 12, 1809; studied law at Pisa, and for a time practised at Florence. In 1848 he published a volume of verse under his own name, and was elected a member of the Tuscan chamber of deputies in 1848. Among his most notable poems were "The Day of Wrath" (1835); "The Simpleton" (1836); "Girella" (1840); "Sant' Ambrogio" (1844). He died in Florence March 31, 1850.

Givors (zhē-vor′), a town in the French department of Rhone, on the river Rhone 14 miles S. of Lyons. Glass, especially bottles, and silk and iron goods are extensively manufactured, and there is considerable trade in coal. Pop. (1901) 12,132.

Gizzard, a muscular division of the stomach in birds; it is an elongated sac in the body of birds just below the liver, and having two openings above, the one into the duodenum and the other into the proventriculus. The gizzard of the raptorial bird is thin and feeble, while that of the graminivorous bird is strong, with thick and muscular walls, the whole lined with a thick horny epithelium.

Glacial Acetic Acid, concentrated acetic acid, containing 84 per cent. of $CH_3 \cdot CO \cdot OH$. It is so called because it forms a colorless crystalline mass like ice when it is cooled to 34° F., and it remains crystalline till the temperature rises to 48° F.; specific gravity 1.065. It is used externally as a caustic irritant, vesicant, and escharotic.

Glacial Drift, in geology, transported material, in the carrying or deposition of which ice, in the form either of land ice or of icebergs, took the leading part. The smoother surfaces of the bowlders and pebbles generally exhibit a series of scratches, parallel to each other if made contemporaneously, though, if arising at different periods, a newer set of scratches may cross an older one. The fossil remains are those of more or less arctic mollusks and other animals. It is the same as bowlder drift.

Glacial Period, a period or epoch during which ice largely prevailed, the climate, in what are now temperate latitudes, being polar. It commenced during the Newer Pliocene, and terminated before the close of the Post-Pliocene age. Arctic conditions did not prevail unintermittingly during all this time. See GEOLOGY.

Glaciers. The summits and sides of mountains above the limit of perpetual snow are covered with a crust which is harder than common snow, yet not like common ice. More ice is formed on the sides of mountains than on their summits, but this does not constitute the glaciers properly so called. The glaciers are vast fields of ice extending from the declivities of the mountains down into the valleys below the snow line, and bearing a considerable resemblance to a frozen torrent. They take their origin in the higher valleys above the limit of perpetual snow, where they are formed by the congelation of large masses of snow in that particular condition called by French writers *névé,* by German authors *firn.* The ice of which glaciers are formed is different from that produced by the freezing of still water, and is composed of numerous thin layers filled with countless bubbles of air. It is likewise both more brittle and less transparent than common ice.

The glaciers continually move downward into the valleys, and not infrequently reach the borders of cultivation, sometimes even descending so far as to sweep away villages in their course. The rate at which a glacier moves varies from 18 to 24 inches in 24 hours. At its lower end it is generally very steep and inaccessible, the nature of the ground in some cases producing a solid cascade of ice of 1,000 feet in height. In the middle part of its course it is more level but gradually becames steeper in the ascent toward its source. The appearance presented by a glacier in the middle part of its course is that of a frozen stream with an undulating surface more or less broken up by fissures or crevasses of varying length and width. As it descends it experiences a gradual diminution from the action of the sun and rain and likewise from the heat of the earth in the valley which forms its bed. This last circumstance produces a phenomenon which is universally attendant on glaciers — the issue of a stream of ice-cold turbid water from its lower extremity.

The ice being gradually undermined by the action of the water, is scooped out in the form of an arched cavern, and the stream,

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besides its supplies from the substance of the glacier itself, is fed by the rain water which percolates from above through the fissures of the ice, and likewise by natural springs from beneath the earth. The descent of the glaciers is shown by the changes in the position of large masses of rock at their sides and on their surface. The former are evidently pushed along by the ice and near the Grindelberg in Switzerland it has been found by examination that stones have been pushed forward 25 feet in one year. A remarkable series of phenomena in connection with glaciers is presented by the moraines, as they are called in Switzerland, consisting of accumulations of stones and detritus, which in some cases are piled up on the sides of the glaciers, in others scattered along their surface. They are composed of fragments of rock detached by the action of ice and other causes from the sides of the valley which forms the bed of the glacier. Moraines are either lateral, when they are formed at the sides of glaciers; median, when on the surface of glaciers, in which case they have arisen from the union of the lateral moraines of two united glaciers; or terminal, when they are deposited by glaciers at the lower end of their course.

The fissures or crevasses above mentioned are due to the unevenness of the ground over which the glacier travels. These crevasses may be either transverse or longitud inal and are constantly being closed up or renewed. Glacier tables, or large masses of rocks supported on pillars of ice, are not seldom seen on the surface of glaciers. The rock represents a former level of the glacier from which it has subsided through the action of sunshine and other causes, and the ice pillar has been prevented from melting by the rock which rests on it. The origin of glacier cones of sand and other materials is practically the same as that of glacier tables. Cavities in the ice through which streamlets of water on the surface of the glacier descend to the muddy current beneath are known as moulins.

The most celebrated glaciers of Europe are those of the Alps which are of the type known as Alpine. From each *névé* field high up in a valley inclosed by steep ridges only a single glacier or "tongue" proceeds, and this grows narrower and smaller as it descends. The larger glaciers of this type which occupy a whole valley, are known as primary glaciers or glaciers of the first order, and many of these receive tributary glaciers, or are formed by the union of two or more head glaciers. The total number of glaciers in the Alps is about 2,000, of which about 250 are of the first order, and the total area covered by them is about 1,500 square miles.

The largest of these glaciers is the Aletsch, which is formed on the S. E. slope of the Jungfrau, between the Aletschhorn and Finsteraarhorn, in the canton of Valais, and flows S. E. and S. W. toward the Rhone into which it discharges by the Massa river, near Brieg. It has an area of about 50 square miles, a length of nearly 15 miles, and a mean breadth of nearly 1,950 yards, and it receives on the right bank the tributary Middle Aletsch and Upper Aletsch glaciers. Next in size among the glaciers of the Alps is the much smaller Gorner glacier with a length of fully 9¼ miles, and an area of about 27 square miles. It flows W. and N. from the N. part of Monte Rosa toward Zermatt, and like the Aletsch, belongs to the Rhone valley. The Mer de Glace descends from the N. slope of Mount Blanc toward the valley of Chamouni. It is formed by the union of three head glaciers, the Glacier de Géant (or du Tacul), the Glacier de Léchaud, and the Glacier du Talèfre, and it has an area of about 16 square miles and a length of 9 miles. Only slightly smaller in area than the Mer de Glace is the Viesch glacier, to the E. of the Aletsch and the S. of the Finsteraarhorn, which discharges into the Rhone below the Viesch.

Next in importance so far as Europe is concerned, to the glaciers of the Alps are those of Norway, which are regarded as forming a distinct type known as Norwegian. Here immense snow fields are found from each of which many glaciers descend in different directions. The most extensive of these snow fields and the largest in Europe, is the Jostedalsbrä, to the N. of the Sogne Fiord, which has an area of over 500 square miles. It gives rise to about 24 primary glaciers, besides a very large number of secondary ones. Farther S. beside the Hardanger Fiord is the second largest snow field in Norway, known as the Folgefond. Its chief glacier is the Bondhuus, on the S. W. Small secondary glaciers occur on the N. slopes of the Pyrenees, and also on the Sierra Nevada; and immense primary glaciers are found in parts of the Caucasus. There are large glaciers in Iceland and Spitzbergen.

Outside of Europe, glaciers are found in Greenland, Alaska, and other parts of North America; in the Himalaya, Hindu Kush, Karakorum, and other mountains of Asia; in Africa, high up on Kilima-Njaro; in the Southern Alps of New Zealand; and in the Andes of South America. The glaciers of Greenland are usually regarded as constituting a type distinct from the Alpine and the Norwegian. They are simply tongues of ice projected down the ice fiords to the coast from the immense expanse of ice which covers the whole interior of the country, and they travel at a much quicker rate than those of Europe. The two largest are the Jacobshavn glacier in Disko bay, which is 13 miles long and over 1½ miles in breadth at its end; and the Humboldt glacier at

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Smith sound, which is over 60 miles broad. Several of the many glaciers of Alaska are of immense size; notably the Malespina glacier near Mount St. Elias, "a plateau of ice having an area of between 500 and 600 square miles," and the Muir glacier on Glacier bay, to the S. E. of the former, with an area of about 350 square miles. In the neighborhood of Mount Cook, in the Middle or South Island of New Zealand, there are many large glaciers, of which the most important are the following: Tasman glacier, 18 miles long, over 2 miles broad, and about 21 square miles in area; Murchison glacier, nearly 11 miles long and 1½ mile broad; Godley, Müller, and Hooker glaciers. Icebergs, as is well known, are simply huge pieces detached from glaciers that flow into the sea in the Arctic and Antarctic regions.

Various theories have been put forward to account for the descent of glaciers. The late Prof. J. D. Forbes went in 1841 to the Alps, and with two summers' investigations completed the observations necessary to define the phenomena very correctly, making at the same time careful measurements of the amount of the motion. He showed that a glacier moves downward very much like a river; the middle and upper parts faster than the sides and the bottom. At the sides and bottom the motion of the ice is retarded by friction. He pointed out the analogy between the way in which the glacier flows down its valley and the way in which a mass of thick mortar or a quantity of pitch flows down an inclined trough, and he put forward his well-known viscous theory of glaciers, which accounts for the phenomena on the hypothesis that ice is a plastic body.

A mass of ice having been formed in the upper parts of the valley, flows gradually down, owing to its own weight. The middle and the surface move more rapidly than the sides and bottom, as we have said; and while, except here and there at places where great crevasses form, the ice flows down as one hard mass, the parts of the solid are moving relatively to each other. This, it need scarcely be said, is not a property of any common solid. Ice, according to Forbes, is a mass more like a liquid than a solid. It flows down its bed like a very viscous liquid — like treacle or like pitch, for instance. This at first sight is surprising, for everyone knows how brittle ice is. But if anyone will take the trouble to examine a piece of shoemaker's wax and observe how brittle it is and will afterward lay the wax down on a shelf for a week or two he will be convinced, by seeing the wax actually flow down, that the brittleness and the plasticity of ice are by no means incompatible.

The next step in the glacial problem is to explain the plasticity of ice. In that, as we have said, Forbes was not successful; but the explanation has been given by Prof. James Thomson. Faraday observed a curious phenomenon respecting ice, well known, it is true, long before to fishmongers and others accustomed to work with ice, but which, till he noticed it, had escaped naturalists. To this phenomenon the name regelation of ice has been given. When two pieces of wet ice are put in contact they adhere to each other. The very slightest pressure is sufficient to bring this about. They are found then to be united into one mass. This is the phenomenon of regelation. Faraday was not successful in his explanation of the phenomenon, though he made many very beautiful experiments illustrative of it. It was reserved to Prof. James Thomson to explain it thoroughly, and having generalized the principle on which he explained it, to apply this principle to the motion of glaciers. Water, he discovered, when it is subjected to pressure, freezes at a lower temperature than when the pressure is removed. Consequently when ice is subjected to pressure it melts. In melting it gives out cold, if we may use the expression; in other words, a certain quantity of heat is made latent during the melting, and the water, therefore, which comes from ice melting under pressure is cooled below the ordinary freezing point of water. If it is relieved of pressure the water again solidifies. It is evident therefore, that if two pieces of ice are pressed together the ice tends to relieve itself by melting at the surfaces pressed. Water flowing from the places of pressure out to places where it is relieved of pressure, solidifies again as soon as it has escaped. This explains Faraday's phenomenon of regelation. But farther, Prof. Thomson, extending this principle, showed that ice strained in any way tends to relieve itself of its strained condition by melting at the strained parts; and its substance freezes again when it has relieved itself in this way of the strain applied. This, when applied to the glaciers, gives a complete explanation of their plasticity. Pressed downward by the vast superincumbent mass, the ice gradually yields. Melting and refreezing takes place at some parts, at others the gradual yielding at strained points goes on. In the latter process there is no visible melting, but there is the gradual yielding from point to point to the pressure above, and there is the transference relatively to each other of the molecules that constitute the, at first sight, solid mass. It is thus seen that ice, under enormous pressure tending to change of form, acts rather like a viscous fluid than like a solid. When however at particular points intense strain is put upon it, it is found, as is well known, to be very brittle indeed. It is this brittleness that causes the cre-

vasses that are formed at places where the descent is unusually steep.

Glacis (glā′sis), in fortifications, the superior slope of the rampart of the covered way, or, where the rampart does not exist, the declivity immediately in front of the ditch of a work, forming a gentle slope toward the country, and protecting the reventment of the escarp from the fire of an enemy.

Gladbach, or **München Gladbach,** a town of Rhenish Prussia, 16 miles W. of Düsseldorf. It is the center of the Rhenish cotton-spinning industry and has manufactures of silk, wool, linen, and paper, cotton printing works, dye works, bleachfields, iron foundries, machine shops, breweries, and brickworks. Gladbach, which has been a town since 1366, was formerly the seat of an important linen trade; the cotton industry was introduced in the end of the 18th century. The town formerly contained a famous Benedictine abbey, founded in 792, and still possesses a church dating from the 12th and 13th centuries, the crypt from the 8th. Pop. (1905) 60,709.

Gladden, Washington, an American author; born in Pottsgrove, Pa., Feb. 11, 1836; was graduated at Williams College in 1859; ordained in the Congregational Church, and became pastor of the First Congregational Church in Columbus, O., in 1882. He is widely known as a writer on social reforms. His publications include "Plain Thoughts on the Art of Living" (1868); "Workingmen and Their Employers" (1876); "The Young Men and the Churches" (1885); "Burning Questions" (1889); "Tools and the Man" (1893); "Social Facts and Forces" (1897); "The Christian Pastor" (1898); "How Much is Left of the Old Doctrine" (1899); etc.

Gladiator, one of a class of men whose profession was to fight in public for the entertainment of the people. They were armed with deadly weapons, and usually fought in pairs. The numbers of these men were principally recruited from prisoners of war, or refractory slaves sold by their masters to the lanista, or trainer. Malefactors also were occasionally forced into fighting as gladiators, and occasionally Roman citizens offered themselves voluntarily for hire, and to such the specific term auctorati was applied, their pay being called auctoramentum. Under the more worthless and dissolute emperors, equites, priests, and senators did not scruple to contend in the arena, in the hope of attracting the attention and gaining the favor of the prince; and even high-born women were found who consented to pander to the appetite for novelty, by fighting with each other or with dwarfs. Gladiators were divided into classes according to the manner in which they were equipped, and were in many cases named from the nation whose characteristic arms they bore. The representatives of different nations were frequently matched against each other, and the comparative efficiency of their weapons, offensive and defensive, was thus put to the test. The classes most frequently mentioned are — the Thracians, armed with a light circular buckler and short crooked cutlass; the mirmillones, equipped as Gaulish warriors, with an oblong shield, curved to match the shape of the body. The retiarii were armed with a net and a kind of three-pointed spear or trident with a long handle, but were destitute of defensive armor; they were usually paired with a heavy-armed

ROMAN GLADIATOR.

opponent, a mirmillo for example, who was in this case designated secutor; the retiarius, being no match for his antagonist in a hand-to-hand fight, endeavored, as the latter approached, to throw his net so as to entangle him in its meshes, and, if successful, stabbed him with the trident before he could extricate himself. If the cast failed he was compelled to take to flight, was chased by the secutor and if overtaken easily dispatched. If, however, the retiarius contrived to evade his pursuer until he was prepared for a second throw, then the contest was renewed as at first, and continued till one or the other was baffled or exhausted. If one of the combatants was wounded so as to be unable to continue the fight, the life or death of the wounded man,

who held up his finger in token of submission, depended upon the pleasure of the president, who usually, as a matter of courtesy, referred it to the spectators, who signified their decision by raising or depressing their thumbs, according as they wished him to be killed or saved.

Gladiolus (-ō′lus), a genus of *Iridaceæ*, with beautiful spikes of flowers, sword-shaped leaves and corms or bulbous rhizomes. They are propagated by offset corms or from seed; in this way innumerable hybrids have been produced. The hardy European forms are well adapted to the mixed border, wild garden or shrubbery in dry and sunny situations.

Gladstone, Herbert John, Viscount, an English statesman; born in London, Jan. 7, 1854; youngest son of William E. Gladstone (see below); was educated at Eton and Oxford, became successively a Lord of the Treasury, Financial Secretary of the War office, Under-Secretary of the Home office, and chief whip of the Liberal Party (1899-1906); was raised to the peerage (an honor his father twice declined) and appointed the first Governor-General of the South African Union in 1910.

Gladstone, William Ewart, a British statesman; born in Liverpool Dec. 29, 1809, the birth year of Tennyson and several other eminent men. He was of Scottish descent on both sides. His father, John Gladstone, a wealthy Liverpool merchant, afterward a member of Parliament and a baronet, was a native of Leith, and belonged to a Lanarkshire family that can be traced back for not a few centuries; while his mother, Anne Robertson, belonged to the North of Scotland, her father having at one time been provost of Dingwall. William Ewart, their third son, was sent, like his brothers, to Eton (in 1821), where, without being specially distinguished, he took a good position on the score of scholarship and personal character, and began his literary career as a regular contributor to the "Eton Miscellany." One of his chief Eton friends was Arthur Henry Hallam, for whom Tennyson's "In Memoriam" forms such a noble poetic monument. He remained at the school for about six years, afterward read for some time with private tutors, and in 1828 entered Christ Church, Oxford. Here his studies were regular and systematic, and at Michaelmas, 1831, he took his degree with first-class honors in both classics and mathematics. At this time his views were decidedly Conservative and High Church, and it was natural that as a prominent member of the Oxford Union debating society he should give them free vent. He left Oxford in the spring of 1832, and paid a six months' visit to Italy, where he acquired a command of the Italian language and also was enabled to gratify his artistic tastes.

His political career began in 1833, when he was returned to Parliament as Conservative member for Newark, a borough then almost entirely under the influence of the Newcastle family, notwithstanding the passing of the Reform Act. One of the earliest of his speeches in the House was delivered on May 17, 1833, when, in a debate on the abolition of slavery in the West Indies, he made an eloquent defense against what was practically an attack on the management of his father's estates in Demerara. He did not express himself as hostile to emancipation, but as against over hasty measures, and he demanded that the interests of the planters should be duly regarded. It was natural that such a man as Mr. Gladstone should not remain a mere private member, and accordingly we find him appointed a minor lord of the treasury, and subsequently under-secretary for the colonies in Sir Robert Peel's administration of 1834–1835. He was able to strengthen the hands of his colleagues in several debates in which he took part, and in that which preceded the fall of the ministry, namely, on the question of dealing with the revenues of the Irish Church, he delivered an eloquent address on the government side. Mr. Gladstone, of course, went out of office with his chief, to whom he was warmly attached, and for whom he entertained a profound admiration.

For several years he had now a less prominent position in public affairs. In 1838, while he was suffering from an affection of the eyes, he made a tour in the S. of Europe. Previous to this journey he had written a work entitled "The State in its Relations with the Church," which was published in his absence, and of which a fourth edition, revised and enlarged, came out in 1841. The writer endeavors to prove that it is the duty of the State as such to give an active and exclusive support to the established religion of the country, because, among other reasons, "the government stands with us in a paternal relation to the people, and is bound in all things to consider not merely their existing tastes, but the capabilities and ways of their improvement. In criticizing this work in the "Edinburgh Review," in an article which led to a friendly interchange of letters between the two parties, Macaulay characterized the author as "the rising hope" of the "stern and unbending Tories." During his residence in Italy Mr. Gladstone made the ascent of Mount Etna, and also witnessed one of its eruptions. On his return in the following year he married, in July, 1839, Catherine, daughter of Sir Stephen Glynne, Bart., of Hawarden Castle, Flintshire. In 1841 the Whig ministry of Lord Melbourne came to an end, and Peel returned to power. Mr. Gladstone, who was still member for Newark, was now ap-

pointed vice-president of the board of trade and master of the mint, and was also sworn a member of the privy council. In 1842 great fiscal reforms were inaugurated, some of which are understood to have been due to Mr. Gladstone, whose knowledge of questions of this kind was already beginning to be widely known, and whose opinions were now turning more and more in the direction of free trade.

In 1843 he was raised to the presidency of the board of trade (being also a member of the cabinet), and as one of the measures proposed by him at this time we may mention the abolition of restrictions on the export of machinery, while next year he carried a railway bill establishing cheap or "parliamentary" trains. He opposed the proposal to reduce the duty on foreign sugar, however, on the ground that the reduction would be against the interests of Great Britain's West Indian and other colonies. In the beginning of 1845 he resigned office on account of the resolution of the cabinet to remodel and increase the Maynooth grant, a measure which he held it would be inconsistent on his part to support considering his published views regarding the relations of Church and State. But by the time that the bill for the better endowment of Maynooth had actually been brought in by the government (April, 1845), Mr. Gladstone had reconsidered the question, and now found that he could give the bill his hearty support, "believing the measure to be conformable to justice, and not finding any principle on which to resist it." He was out of office only for a short period, having accepted in the end of 1845 the post of colonial secretary, which had been vacated by Lord Stanley owing to his opposition to Peel's changed views regarding the corn laws. Mr. Gladstone was now also quite at one with Peel in regard to the repeal of the corn laws, and feeling that in the circumstances he could hardly continue to represent Newark as practically the nominee of the Duke of Newcastle, he resigned his seat. The result was that though he had an important place in the cabinet, he was without a seat in the House of Commons, and was therefore unable to give his colleagues assistance that would have been of the utmost value to them in carrying their much-contested measure. It was not till 1847 that he again became a member of the House, being then returned as one of the representatives of Oxford University, and still as a Tory, or rather as a Peelite, the name applied to a certain number of politicians forming a party by themselves at this period. Among measures that about this time received his support were the bills for the removal of the Jewish disabilities and the repeal of the navigation laws.

In the winter of 1850–1851 Mr. Gladstone paid a visit to Naples, and was so impressed by the cruelty and tyranny of the Neapolitan government, of which he had fully convinced himself by visits to the prisons and by careful inquiries that on his return he issued one or two letters denouncing the atrocities. The charges which he made produced a profound sensation both at home and abroad, and being brought before the notice of Parliament, Lord Palmerston, then foreign minister, warmly commended the course Mr. Gladstone had taken. One important result was that English sympathy was strongly excited in favor of Garibaldi and the Italian patriots, and that the moral and material support of Great Britain contributed in no small degree to the overthrow of the Italian Bourbons and the establishment of a united Italy.

By this period of his career Mr. Gladstone had begun to display remarkable ability as a financier, and in 1852 he made a damaging attack on the budget brought in by Mr. Disraeli as chancellor of exchequer under Lord Derby. The Derby ministry was defeated and resigned, and on the formation of the coalition ministry of Lord Aberdeen, Mr. Gladstone became chancellor of the exchequer. At this time it was not very clear whether he was to be classed as a Liberal or as a Conservative; many of the latter party had certainly no longer any wish to claim him. His first budget was laid before the House on April 18, 1853, and for five hours the members sat listening not only in silence, but with profound attention and unmistakable pleasure. This was a peace budget, but next year he had to provide for the expenses of the Crimean War. Lord Aberdeen resigned office in January, 1855, and Lord Palmerston succeeded him. Mr. Gladstone again became chancellor of the exchequer; but when the premier consented to a committee of inquiry into the conduct of the late administration, he at once resigned, regarding this measure as an implied censure on his late colleagues. He remained out of office for rather more than four years, during which his former friends, the Conservatives, repeatedly received his support, as in regard to the divorce bill and other measures; and he joined in the vote of censure (on the Conspiracy to Murder Bill) which drove Lord Palmerston from office in 1858. In this year he visited Corfu as commissioner extraordinary to the Ionian Islands, which were then under British protection but were agitating for union with the kingdom of Greece, and he had to report to the home government that such was the wish of the people. His "Studies on Homer and the Homeric Age" not inappropriately appeared at this time.

In 1859 Mr. Gladstone took office under Palmerston as chancellor of the exchequer, and may thus be said to have finally cast in his lot with the Liberal party. He now

carried out various reforms in the national system of taxation, and produced a series of budgets as interesting as fairy tales and as satisfactory in their results as they were interesting. One of his earliest measures was the abolition of the excise duty on paper, which was practically a tax on literature and an obstruction to popular education; another was the conclusion of the commercial treaty with France, already negotiated, a measure equally beneficial to both countries. During the American Civil War his sympathies were on the side of the South; but though many of his admirers regretted this, others among them had their feelings inclining in the same direction. At the general election of 1865, owing to his views regarding the Irish Church, he lost his seat for Oxford University, which he had represented continuously since 1847; but he was forthwith returned with great enthusiasm by South Lancashire. In October, Lord Palmerston died, and Earl Russell came into power with Mr. Gladstone as leader of the House of Commons and chancellor of the exchequer. He now joined with Mr. Bright in order to carry a new reform bill, but this step led to the secession of a small section of the Liberal party ("the Adullamites," or "the cave"), and to the defeat of the government, which was succeeded by that of Lord Derby in 1866.

In the next year the Conservatives passed a reform bill establishing household suffrage in the boroughs, but to the final shape which the measure assumed Mr. Gladstone and Mr. Bright materially contributed. In 1866 he succeeded in carrying against the Conservative government his resolutions in favor of the disestablishment of the Irish Church, with large majorities on his side. His Irish Church suspensory bill was similarly carried, but in view of the approaching general election the House of Lords threw it out. By this time Lord Derby had resigned in favor of Mr. Disraeli, who also resigned after a brief tenure of office.

The general election on the extended franchise took place toward the end of 1868. The result was a great triumph for Mr. Gladstone, who was now the recognized leader of the Liberal party. His former constituency, indeed, rejected him, but he was returned for Greenwich, and in the new house the Liberals were in a majority of 120. He at once became prime minister, and the next six years are undoubtedly the most brilliant in his whole career, while at the same time a most memorable period in the history of the country. In 1869 he carried his bill for the disestablishment of the Irish Church, and next year a highly important land act for Ireland. Among other measures passed in this Parliament may be mentioned the establishment of the national systems of elementary education

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in England and Scotland, the introduction of voting by ballot, the abolition of purchase in the army (by a somewhat arbitrary use of the prerogative of the crown), besides acts dealing with bankruptcy, public health, mines, university tests, etc. In 1873 his University Bill for Ireland was defeated, as it failed to satisfy either Protestants or Roman Catholics, and Mr. Gladstone resigned. Mr. Disraeli, however, would not undertake the task of forming a ministry and he had to resume the reins of power. But the by-elections were now beginning to go decidedly against the government, and when in January, 1874, Mr. Gladstone appealed to the country, the result was that Mr. Disraeli became premier in his stead.

He now formally resigned the leadership of the Liberal party, and was succeeded in this position by the Marquis of Hartington (afterward Duke of Devonshire). For a time he ceased to be prominent in public affairs, and devoted more of his attention to literary, historical, and ecclesiastical matters, two pamphlets on the Vatican decrees coming from his pen. The eternal "Eastern Question" brought him once more to the front, and in 1876 he published a pamphlet in denunciation of the Bulgarian "horrors," and proposing the expulsion of the Turks from Europe "bag and baggage." This manifesto undoubtedly weakened the position of the government, a result to which his attacks on the Anglo-Turkish treaty and the Afghan War also contributed. At the end of 1879, the time for the election of a new Parliament being now almost at hand, he entered on what has generally been known as the (first) "Midlothian campaign"; an astonishing exhibition of eloquence and vigor, intended to stir up his numerous supporters in Scotland to lend their aid in ousting the Conservatives from office. Parliament was dissolved at the end of March, Mr. Gladstone was triumphantly returned for Midlothian, and for a second time became premier with a handsome majority on his side, being also for two years chancellor of the exchequer.

Ireland first claimed the attention of the new government, and a second land act was soon passed by Mr. Gladstone, under which fixity of tenure, fair rents, and free sale were secured for the Irish tenant farmers. Since the establishment of the Land League, however, and under the movement for Home Rule led by Mr. Parnell, that country had got into a most disturbed state, and strong repressive measures were deemed necessary. A Crimes Bill and an Arms Bill were accordingly passed, and Mr. Parnell was arrested and lodged in Kilmainham jail with several of his supporters. In the spring of 1882 he was released, apparently on the understanding that he would give some aid in putting down outrages. This arrangement with the Home Rule leader, scoffingly

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designated by opponents as the "Kilmainham treaty," at once led to the resignation of the lord-lieutenant and the Irish secretary, Mr. Forster. Then followed the Phœnix Park tragedy — the murder of the new chief secretary, Lord Frederick Cavendish, and the under-secretary, Mr. Burke — to which the government responded with a Crimes Bill and an Arrears of Rent Bill, the former meeting with the most determined resistance on the part of the Irish members, now past masters in the art of parliamentary obstruction. Abroad the government had to deal with affairs of great difficulty in Egypt and the Sudan and also in South Africa, and some of the settlements arrived at did not greatly redound to their credit. The fate that overtook Gordon at Khartum certainly did Mr. Gladstone much damage with the electorate. In 1884 the question of parliamentary reform was again taken up, and on Feb. 28 Mr. Gladstone expounded his new measure in a speech of great power and lucidity. Both parties in the State were now practically agreed that the time for reform had again come, and the bill for extension of household suffrage to the counties passed in the end of the year, and the redistribution bill early in the following year under Lord Salisbury, Mr. Gladstone having by this time resigned office when defeated on an amendment to his budget proposals.

The general election of 1885 took place under the new electoral arrangements, and when the polling closed it was found that Mr. Gladstone's followers were exactly equal in number to the Conservatives and the Parnellites combined, the latter now forming a compact body of 86. Thus the electors had not effectively responded to his appeal for such a majority as would make the Liberal party independent of the Irish vote. By the end of the year statements were published to the effect that Mr. Gladstone's views on Home Rule had undergone a change, and that he was now prepared to surrender to Mr. Parnell's demands and grant to Ireland a Parliament of her own. The majority of his supporters and admirers were slow to believe this, but all doubt was set at rest when, having succeeded Lord Salisbury as premier, he brought forward in Parliament (in April, 1886) a scheme for the government of Ireland on Home Rule lines, combined with a plan for buying out the Irish landlords. The bill being defeated, the government naturally resigned, and on an appeal to the country the Conservatives returned to power under Lord Salisbury, who had now on his side a majority of more than 100.

Mr. Gladstone's proposals had thus been emphatically condemned, many of his oldest and most influential supporters had turned against him, and the old Liberal party had been broken up. His personal relations with Mr. Parnell now became rather close, but the disgraceful figure cut by the latter in the divorce court naturally put an end to this, his reëlection as leader of the Irish party having drawn from Mr. Gladstone the statement that notwithstanding the splendid services rendered to his country by the Irish leader, "his continuance at the present moment in the leadership would be productive of consequences in the highest degree disastrous to the cause of Ireland." Mr. Parnell's animus toward him from this time was well marked, but "the uncrowned king" was now shorn of most of his dominions and his reign speedily came to an end. In 1892, after another Midlothian campaign and his reëlection by a greatly reduced majority, Mr. Gladstone became premier for the fourth time, the Irish question being now "the sole link that bound him to public life." In Parliament his majority consisted of only about 40 — taking Liberals and Parnellites together — and thus his party was entirely dependent on the latter. Next year he brought in another Home Rule Bill which differed considerably from the previous one. It was forced through the House of Commons, largely by the heroic exertions of Mr. Gladstone himself, but was rejected in the House of Lords by an overwhelming majority. By this time age had begun to tell even on his wonderful vitality. His memory, his eyesight, and his hearing were not what they had been, and in 1894 he resigned office and practically retired from public life, being succeeded in the premiership by Lord Rosebery. He retained his seat for Midlothian, however, till the general election of 1895, which proved so disastrous for the policy he had advocated. His last speech as premier was on the Lords' amendments to the Parish Councils Bill, which drew from him the declaration that the amending power of the peers ought not to be allowed to continue. His closing years were chiefly devoted to literary pursuits, though he both spoke and wrote in denunciation of the atrocities perpetrated by the Turks on the Armenians and advocated the cause of the Cretans and Greeks as against the Turks. Latterly he was attacked by a cancerous growth in the nasal region, and the national sympathy was warmly expressed on his behalf. He bore his sufferings with fortitude, and after vainly seeking relief abroad for his malady returned home to die. On May 19, 1898, he peacefully expired at Hawarden Castle, long his favorite residence. In accordance with the universal sentiment of the nation he was buried at Westminster Abbey. He was survived by his wife and by three sons and three daughters. His eldest son, William Henry, after being a member of Parliament and lord of the treasury, died in 1891, leaving a son to inherit the Hawarden property. His young-

est son, Herbert, has been well known as a representative of Leeds, and as holding various posts in different governments.

Of Mr. Gladstone's political career different estimates will be formed by different persons; regarding his moral and intellectual eminence there can be but little difference of opinion. Though specially great as an orator, a financier, and a parliamentary leader, his mental powers were such that he might have made a foremost position for himself in any walk of life, and it is not absolutely certain that politics was the sphere best suited for the exercise of his extraordinary gifts, though from his birth and early surroundings it was natural that he should adopt a political career. That he was fond of power and of popular applause is doubtless true; but he was not ambitious in the lower sense of the word, and cared nothing for titles or for the influence that wealth bestows. Tyranny and oppression found in him a fiery opponent, but his imagination was perhaps too easily heated. A deficiency in the sense of humor may be noted as part of his temperament. Earnestness and a severe and lofty morality were the most pronounced features of his character; and theological speculation and Biblical and ecclesiastical studies were naturally congenial to him. Though his intellectual and moral sympathies were wide his mind was receptive rather than creative, and neither his spoken nor his written words have added much to the world's stock of fruitful ideas.

Mr. Gladstone wrote extensively and on a variety of topics and his books, including collections of speeches, magazine articles, etc., are rather numerous. His "Rome and the Newest Fashions in Religion" (1875) sets forth his views on Vaticanism; his "Gleanings of Past Years" (7 vols., 1879) comprise a number of papers in which ecclesiastical topics bulk largely; his matured views on Ireland are given in "Special Aspects of the Irish Question" (1892). His Homeric studies belong chiefly to the middle period of his life and besides the work already mentioned include "Juventus Mundi: the Gods and Men of the Heroic Age" (1869); and "Homeric Synchronism: an Inquiry into the Time and Place of Homer" (1876); with a "Primer of Homer," and a little book entitled "Landmarks of Homeric Study." Homer he regarded as the author of both "Iliad" and "Odyssey." To the closing period of his life belong "The Impregnable Rock of Holy Scripture," a work in support of the orthodox view of the Mosaic writings; verse translations of "Horace's Odes"; "The Psalter, with a Concordance"; and an annotated edition of Bishop Butler's Works, with a volume of "Studies Subsidary to the Works of Bishop Butler" (1896).

Glagolitic Alphabet, an ancient Slavonic alphabet. The Slavonic languages have from very ancient times been written with two alphabets, the glagolitic and cyrillic. The later is the modern Slavonic and Russian alphabet; the former is still used in Istria, Croatia, and Dalmatia, and its use has been authorized in the Roman Catholic liturgies of those districts. It has been found in two different forms, the fuller of which has 40 signs.

Glair, the white of eggs, used as a varnish for preserving paintings. Bookbinders also use it for finishing the backs of books.

Glaisher, James, an English meteorologist; born in London, April 7, 1809. When 20 years of age he began to make meteorological observations as an officer of the Ordnance Survey of Ireland. For three years from 1833 he was employed in the observatory at Cambridge, and in 1836 removed to Greenwich, where four years later he became superintendent of the magnetical and meteorological department of the Royal Observatory, a post which he held for 34 years. After 1841 he prepared the annual and quarterly meteorological reports issued by the registrar-general. Between 1862 and 1866 he made 28 balloon ascents for the purpose of studying the higher strata of the atmosphere, on one occasion reaching a height of over 7 miles. He was the founder of the Royal Meteorological Society, and became a Fellow of the Royal Society in 1849. He wrote numerous works and papers on astronomy and meteorology. In 1879–1883 he published a complement to Burckhardt and Dace's "Factor Tables." He died Feb. 8, 1903.

Glammis, a village of Scotland, five miles S. W. of Forfar. Near it is Glammis Castle, in which is still shown the chamber in which Malcolm II. was assassinated in 1034. It was one of the castles of Macbeth, and gave him his hereditary title of Thane of Glammis.

Glance, an order of minerals, of which GALENA (*q. v.*) or lead glance may be regarded as a type. All of them are metallic, and many of them are known by names indicating the metal which is their principal constituent, as lead glance, silver glance, bismuth glance, etc. In these and many other species the metal is combined with sulphur, so that the mineral is a sulphuret; but there are also numerous species of glance in which sulphur is not present, but selenium, arsenic, or tellurium takes its place. In some kinds, also, two or more metals are present instead of one, in combination with one or other of these non-metallic or semi-metallic substances. Thus, gold glance, or silverite, consists of gold and silver in combination with tellurium.

Gland, a term at first vaguely applied to any smooth, round viscus, but which is now limited to such of these as secrete — *i. e.*, separate by a process of cell growth, certain constituents of the blood which are afterward poured out from the gland by means of a duct. While yet the term glands was vaguely used, Sylvius divided them into conglobate and conglomerate glands. To these Malpighi added the follicular or simple glands found in the fauces and behind the ears. They are now divided into lymphatic and secreting glands.

Lymphatic glands are bodies resembling glands in form, but not possessing ducts for secretion, so that their products must be conveyed to them by lympathic or sanguiferous vessels. Examples, the spleen, the thyroid body, the thymus gland, the suprarenal capsules, the pituitary body, the follicular glands at the root of the tongue and the lympathic glands.

Secreting glands are the typical kind of glands to which the name is now very frequently restricted. They collect and discharge at particular parts various matters derived from the organism, that these may be further employed for special purposes in the economy, or simply eliminated as redundant material or waste products. In the latter case the term used is excretion. In this process the nucleated cell takes a prominent part. When there is a simple recess formed of secreting membrane, the gland is said to be simple. Examples of this structure occur in the mucous membrane of the stomach, the intestines, etc. When the cavity is subdivided as well as extended with the view of increasing the secreting surface, the gland is said to be compound. The latter are again subdivided into first tubular and second sacular or racemose glands. The glands of the testicle and those of the kidney are tubular; the salivary, lachrymal, and mammary glands, and most of the glands opening into the mouth, the fauces, and the windpipe are racemose glands. They and some others constituted the conglomerate glands of Sylvius.

In botany, cells or aggregations of cells distinguished from those in their neighborhood by containing resinous, oily, sugary, or fragrant substances. The walls of the cells generally become degenerated, and are ultimately dissolved, a cavity being thus formed as seen in the rind of the orange and lemon. In other cases the secretion is discharged externally. Ordinary glands occur in almost all the tissues of plants. Nectaries or honey-secreting glands of flowers are superficial, and are met with on all parts of the flower and receptacle. Mirbel divides glands into vascular glands, in which there are cells and vessels united, and cellular glands, which consist of cellular tissue alone. Glands may be simple, compound, internal, lenticular, sessile, or stalked, etc.

Glanders, a disease among horses, indicated by a discharge of purulent matter from one or both nostrils, with a hard enlargement of the submaxiliary glands. In acute glanders the discharge, by its copiousness, impedes respiration and ultimately produces suffocation. The disease is highly infectious, and may even be communicated to man by the purulent matter coming in contact with any part where the skin is broken. The disease is rarely if ever cured.

Glandular Hairs, hairs possessing glands of any kind, and wherever situated. DeCandolle divided them into glandiferous hairs, in which the gland was formed at the summit of the hair, and excretory glandular hairs, in which it was at the base.

Glandular Tissue, or **Glandular Woody Fiber,** tissue or woody fiber marked by rows of glands, ducts, or regular punctuations, having a central pore surrounded by a discoidal area, these rows of dots being placed in series, and parallel with the medullary rays. They exist chiefly in the *Coniferæ,* but also in the *Winteraceæ.*

Glans, a fruit sometimes called a gland, placed by Lindley in his class called *Syncarpi,* and the section of it with inferior fruit. It is hard, indehiscent, dry, one-celled, with one or few seeds. It is developed from an ovary having several cells and several seeds, nearly all of which are abortive. It is situated within the kind of persistent involucre called a cupule. The pericarp is crowned with the remains of the calyx teeth, but being minute they easily escape observation. Sometimes the glans is solitary, as in the oak; at others there are more than one of them in the cupule, as in the sweet chestnut and the beech.

Glanville, Ranulf de, an English jurist; born in Stratford, Suffolk, England; made sheriff of York in 1165; was custodian of Queen Eleanor in 1173–1189; and chief justiciary of England in 1180. He was imprisoned by Richard I. about 1185, and on being released entered the Order of the Cross and went to the Holy Land. He was the author of a "Treatise Concerning Law and the English Constitution," the first writing on the Anglo-Norman judicial system. He died during the siege of Acre in 1190.

Glaphyra (gla-fī′rä), wife of Archelaus, high-priest of Bellona, at Comana, in Cappadocia, seduced Marc Antony by her beauty, and obtained from him the kingdom of Cappadocia for her sons, Sisenna and Archelaus.

Glaphyria (-fir′i-ä), a genus of myrtle-blooms, tribe *Myrteæ. G. nitida* is called by the Malays the tree of long life, from ascending on the hillside higher than any other tree.

The natives of Bencoolen call it the tea plant, and use it as a substitute for tea.

Glarus (glä'rös), a canton of Switzerland, bounded by the cantons of St. Gall, the Grisons, Uri, and Schwyz; area, 267 square miles; capital, Glarus. It is an Alpine region, trenched by the valley of the Linth or Limmat and its lateral vales, and rising in its S. W. corner, in the Tödi peak, to an altitude of 11,887 feet. The rearing of cattle and the manufacture of cotton and woolen goods are the chief occupations of the people. The green cheese called Schabziger is wholly made here. Pop. (1908) 31,416.

Glarus, a town and capital of the Swiss canton of Glarus; 43 miles S. E. of Zurich. It was founded by an Irish monk, Fridolin, in the end of the 5th century. Zwingli was pastor here from 1506 to 1516. Glarus, having been peopled by German settlers, passed after various changes into the possession of the dukes of Austria, but ultimately secured its independence by the victories of Näfels in 1352 and 1388. In 1459 it joined the Swiss Confederation.

Glasgow, the largest city in Scotland and the second largest in the United Kingdom, is situated in the counties of Lanark and Renfrew, on both banks of the Clyde, which flows through it in a W. direction, while the N. W. part of the city is intersected by the Kelvin, a tributary of this river. Much the largest and most populous portion of the city is in Lanarkshire and of this portion again the greater and more important part is on the right or N. bank of the Clyde. Glasgow now forms a county of a city as well as a municipality, and the boundaries were recently extended; but the contiguous police burghs of Partick on the N. of the river, and Govan, Kinning Park, and Pollokshaws on the S., with other populous areas, are as yet outside its limits. The city measures about 6 miles from N. W. to S. E., and about 5 miles from N. E. to S. W., but this includes parks and areas not built on. The ancient nucleus of Glasgow was situated on the N. side of the Clyde, but extensions were early made to the S. side in the Gorbals and other suburbs. The S. portion of the city mostly occupies low-lying or undulating ground, while the greater part of the N. portion stretches over a series of elevations of varying heights. The chief extension of the city may be said to have taken place from E. to W. and its growth is still continuing in that direction (as well as in others), some of the finest residential districts being in the W., such as Hillhead, Kelvinside, and Dowanhill. The central part of the city, on the right bank of the river and for some distance N., contains the general business or commercial quarter and the terminal railway stations. The N. and S. sides of the river are connected by bridges and ferries, the latter at convenient intervals toward the W. where the shipping traffic on the river makes the erection of bridges impracticable. Proceeding from W. to E. the following bridges may be noticed: The Caledonian Railway bridge, leading into and out of the Central Station; Glasgow or Broomielaw bridge, in line with Jamaica street, a stone bridge 80 feet broad, recently rebuilt and widened, the features and materials of Telford's earlier structure (1835) being retained; Portland street Suspension bridge; Victoria bridge (stone), Stockwell street; the Union Railway bridge (stone and iron), used by the Glasgow and Southwestern Railway Company; the Albert bridge (stone and iron), close to Glasgow's oldest park, called The Green; Rutherglen bridge; and Dalmarnock bridge. Tunnels under the river have also been formed for cross-river traffic, and a cable subway running in a circular course twice passes from side to side in this way. There are underground and various other local railways, tramways owned by the corporation, and a series of small harbor steamers for passengers.

Glasgow is built mostly of a light-colored sandstone quarried in the neighborhood, but a red sandstone brought from a distance is now being freely employed. The streets are in general wide and straight, running mostly at right angles E. and W., and N. and S., or approximately so. Argyle street with its continuations — E., the Trongate, W., Dumbarton road — forms a great thoroughfare in the former direction. Sauchiehall street and Great Western road (the latter crossing the Kelvin by an elegant bridge) also run E. and W. and accommodate a steady stream of traffic. The busiest thoroughfare from N. to S. is that in the line of Jamaica street and Glasgow bridge, while Buchanan street, also running N. and S., is the fashionable shopping street. Of the older streets, Trongate, High street, and Saltmarket street are the most celebrated; but modern improvements have entirely changed their appearance. In the older parts of the town there are some localities much too densely populated, and which have been, and to some extent still are, dens of vice and disease; but great ameliorations have been introduced under the City Improvement Act, while the commercial progress of the city has caused, simultaneously with its extension, the rebuilding of a large portion of the central district for the sake of improved warehouse and counting-house accommodation. Though having some unlovely features, Glasgow as a whole is excelled by few cities in the kingdom in architectural beauty and general amenity of appearance. It possesses few squares worth mention, the chief being George Square, in the heart of the city,

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and Cathedral Square toward the N. E. On the other hand, it has now a series of fine parks and recreation grounds, the former presenting in some cases natural features of no little picturesqueness, and commanding extensive views, besides attractions such as greenhouses, extensive stretches of flower beds, ponds, etc. The chief are: The Green (140 acres), with a People's Palace and winter gardens; Kelvingrove Park, intersected by the Kelvin; the Queen's Park; Bellahouston Park (178 acres); and Alexandra Park. The city also possesses botanic gardens, with extensive ranges of hothouses, greenhouses, "crystal palace," etc.

Preëminent among edifices stands the Cathedral, Glasgow's only ancient building, in the N. E. quarter of the city, on the edge of a ravine separating it from the Necropolis (the chief public cemetery). It is a large Gothic edifice in the early pointed style, with tower and spire rising from the center, but without transepts; length of interior, 319 feet; width, 63 feet; height of nave, 90 feet; of choir, 85 feet; spire, 225 feet. It is especially distinguished for the beauty of its crypt (or under-church), which is one of the most beautiful in Great Britain. The windows have been filled by private munificence with pain' d glass on a uniform plan, those in the nave and choir being by Munich artists, those in the crypt, chapter house, and lady chapel, by British artists. The cathedral as it at present stands is supposed to have been begun before 1197, and completed within the 15th century. The chancel is used as a parish church, and the structure is under the charge of the government. Many of the other churches are marked by a high degree of architectural merit, but it is difficult to single out any for special notice or to decide which style of architecture predominates: among the more recent perhaps the Gothic, but there are many in other styles, including Greek, Græco-Egyptian, Romanesque, Renaissance, etc. Among other buildings we may first mention those of the university (by Sir George Gilbert Scott) opened in 1870, and covering about four acres of ground, on Gilmorehill, a magnificent site in the W. of the city overlooking the Kelvingrove Park. The main building is an oblong rectangular pile in the Collegiate Gothic style of the 14th century, about 600 feet long by 300 broad, divided into two quadrangles of 180 feet square, united by a center building, and having a tower and open-work spire about 300 feet high rising from the middle of the S. or principal front. The old college gateway in the High street was taken down and re-erected at the new building, forming an interesting link with the past. Another edifice of similar importance is the Municipal Building or City Chambers, accommodating various departments connected with the corporation. This is an imposing structure in the Italian or Renaissance style, occupying a large area, and filling up the whole E. side of George Square; it was opened in 1889, and cost about £530,000. Other buildings abutting on the same square are the postoffice, Bank of Scotland, and Merchants' House. A large and handsome building adorned with sculpture and statuary, has been erected (at a cost of about £250,000) in the Kelvingrove Park, on the S. side of the Kelvin, opposite the university, to serve as a municipal picture gallery and museum; the city pictures forming a valuable collection comprising a number of works by old masters and modern painters. Among other buildings worth special notice are: The United Free Church College, a building in the Italian style with a high tower; the Royal Exchange, a very fine building in the Corinthian style surmounted by a circular clock tower, and having a handsome portico; the Stock Exchange, a striking building in the Venetian Gothic style; the old municipal and county buildings; the Athenæum buildings, the city poor house, the Deaf and Dumb Institution, the Christian Institute, the Royal, the Western, and the Victoria infirmaries, the St. Enoch Station and Central Station Hotels (belonging respectively to the Glasgow and Southwestern and the Caledonian railway), the buildings of Glasgow and West of Scotland Technical College, the high school and other scholastic edifices, the Procurators' Hall, several club houses, banks and insurance offices of a palatial character, besides many of the private warehouses and business premises. In George Square are statues of Queen Victoria and Prince Albert (both equestrian), James Watt, Lord Clyde, Robert Burns, Dr. Livingstone, Sir John Moore, etc., and a tall fluted Doric column surmounted by a statue of Sir Walter Scott. Elsewhere there are also equestrian statues of King William III. and of Wellington, besides an obelisk to Nelson in Glasgow Green, etc. The principal cemetery, the Necropolis, on a rising ground E. of the cathedral, is full of fine monuments. St. Andrews' Halls (erected as a private enterprise and now the property of the city) are the finest suite of public halls. The other public halls include the City Hall, the Queen's Rooms, Trades' Hall, etc. There are several theaters and music halls. There is a public bazar or market house for provisions, fruits, etc., near the center of the city, a fish market, a large cattle market, etc.

The only educational institutions we need notice after the university, (see next article) are St. Mungo's College; Anderson's College Medical School (founded on a different basis in 1796); the United Free Church College (for divinity students); the Glas-

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gow and West of Scotland Technical College, established in 1886; Queen Margaret College for women, connected with the university; the high school, now under the management of the Glasgow school board; the Glasgow Academy and the Kelvinside Academy (both proprietary); the normal institutions of the Established Church and United Free Church; a grammar school for boys and one for girls, connected with the Hutchesons' Trust; Allan Glen's School connected with the Technical College; the Glasgow School of Art; School of Music in connection with the Athenæum; and the Veterinary College. The St. Mungo's College (not as yet provided with special buildings) arose in part out of the need of extending the medical school at the Royal Infirmary, and was opened in 1889, with complete faculties for medicine and law. The Faculty of Physicians and Surgeons, incorporated in 1599, is a body the passing of whose examinations qualifies for general medical practice. The Glasgow school board has schools that can accommodate over 80,000 pupils, but other school boards provide for certain portions of the city area.

Glasgow possesses the usual complement of religious, semi-religious, moral, benevolent, and social organizations of a great town, comprising Bible and missionary societies, young men's and young women's societies, temperance league societies, etc. There are municipal lodging houses and a municipal "family home." Among charitable and friendly institutions a peculiar organization prevails. Nearly every county or district in Scotland has its association of "natives" in Glasgow, who meet periodically and usually contribute to a benevolent fund. There are similar associations for particular surnames, such as Buchanans, Grahams, and Browns. The 14 incorporated trades and the Merchants' House are richly endowed for charitable purposes, as is also Hutchesons' Hospital. Of medical charities, the Royal, Western, and Victoria infirmaries, the Samaritan Hospital for Women, Lunatic Asylum, Maternity Hospital, and hospitals and dispensaries for various diseases may be mentioned, such as the great Ruchill Hospital for fevers. Among literary and scientific institutions we may note the Glasgow Athenæum, with a library, news rooms, etc., the Philosophical Society, the Archæological Society, etc. The principal libraries are the University Library (175,000 vols.), the Mitchell Free Library (about 140,000 vols., which are not lent out, however), endowed by private munificence, and managed by the corporation, the libraries of the Faculty of Physicians and Surgeons and of the Faculty of Procurators, the combined Glasgow and Stirling's Libraries (45,000 vols.), and Baillie's Library. The Public Libraries Acts are to be adopted, and Andrew Carnegie has given $500,000 for the establishments of district libraries. The chief museum is that of the university, known as the Hunterian Museum, being based on that of Dr. W. Hunter, bequeathed to the university in 1783. It comprises coins, anatomical preparations, minerals and zoölogical specimens, pottery, etc., and is open to the public.

The town council consists of 75 councillors, elected by 25 wards, and of the dean of Guild (elected by the Merchants' House) and the deacon-convener of the trades (elected by the Trades' House), as ex officio members. The lord-provost, 14 bailies, and a river bailie and deputy bailie are chosen from among the councillors. The river and harbor are under the management of the Clyde navigation trustees.

The manufacturing industries of Glasgow, including also those of the surrounding and dependent districts, are unequaled for variety by any manufacturing town in the kingdom, with the exception, perhaps, of London. Among the older industries of importance are those connected with cotton, linen, and wool, including spinning and weaving, dyeing and bleaching, calico printing, and Turkey-red dyeing in particular. But the Glasgow of today is most largely dependent on iron and coal, and the importance of its textile industries is relatively less than formerly. It is the leading market for the whole iron production of Scotland and there are blast furnaces and collieries within the city boundaries. The manufacture of malleable iron and steel, and of machinery and metal goods of all descriptions, is immense. The most important industry is shipbuilding and the connected trades, the Clyde, which was the birthplace of steam navigation in Europe, having ever since been closely associated with the growth and development of steam shipbuilding and marine engineering. Some 300,000 tons of shipping are usually built yearly, and in 1899 the total output on the Clyde was over 494,000 tons. Locomotive engines constitute another great industry. There are also extensive chemical works, potteries, glass works, brick works, breweries, distilleries, tanneries, tobacco works, confectionery works, carpet works, printing, publishing, and lithographic works, and a multitude of other industries of greater or less importance.

The commerce of Glasgow is commensurate in extent with the importance of its manufactures, and is closely associated with these. When Glasgow was unvisited by the foreign buyers who came to the great English markets, the enterprise of its own merchants and manufacturers placed its productions in every important market in the world. The consigning trade, that is the consignment by manufacturers of their

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own goods to foreign markets for sale, has consequently here acquired dimensions unusual in English manufacturing towns of the first class, and many wealthy mercantile houses have grown up in the East Indian, American, and other branches of foreign trade. The river itself, the chief highway of this commerce, from being a shallow stream, has by dredging been made navigable for large vessels. Ships loading and unloading here lie partly in the river, partly in docks opening from it, the construction of the latter being a matter of quite recent date. One of these, called the Queen's dock, is on the N. side of the river, and was opened in 1877. It has a length of 3,000 and a breadth of 700 feet, with an average depth of 20 feet, and covers 33 acres; length of quays, 3,334 yards. A similar dock on the opposite side of the river was formally opened as Prince's dock in 1897 by the Duke and Duchess of York. Its water area has an extreme length of 2,000 feet and an extreme breadth of 1,100, and covers 35¼ acres; length of quays, 3,737 yards. One graving dock is 800 feet long. The harbor revenue is now over £400,000 annually; in 1862 it was only £111,500; in 1800, about £3,000.

The total number of vessels that arrived at the harbor of Glasgow in the year ending June 30, 1898, was 11,091, of 3,710,206 tons; the number cleared, 11,169, of 3,730,946 tons; vessels belonging to Glasgow, 1,667, of 1,586,743 tons. The amount of customs duty received at Glasgow exceeds £1,500,000; the value of foreign and colonial produce imported in 1898 amounted to £12,788,374, that of the home produce exported was £13,137,275. Large imports of tea, cotton, and other produce are received coastwise from London and Liverpool. The rental of Glasgow in 1899–1900 was £4,791,000.

All the leading banks of Scotland are represented in Glasgow by numerous branches, and the Union Bank of Scotland and the Clydesdale Bank have their head offices here, as also have some insurance companies. The principal railway systems are the Caledonian, North British, and Glasgow and Southwestern, all of which have large modern termini in the heart of the city. There are underground railways, and the cable subway already mentioned, which twice passes under the river. The Forth and Clyde and Monkland canals form auxiliary means of communication. The traffic on the river and local lines includes a large passenger traffic with the numerous watering places on the estuary of the Clyde and connected lochs which in summer attract great numbers of the well-to-do population of Glasgow. In this large river traffic many swift and handsomely fitted up passenger steamers are engaged. The tramways since 1894 have belonged to the corporation, and are now worked by electricity.

In a sanitary point of view Glasgow has greatly improved in recent times. The average death-rate of the four years from 1872 to 1875 was 29.85 per 1,000. For some years it was generally about 25 per 1,000 per annum. In 1887 the rate was a little below 24, in 1898 a little above 21, which is above that of London and various other large towns. It must still be admitted, therefore, that the city is not so healthy as it might be; and that its atmosphere is polluted with smoke, soot, and other impurities, and its river with sewage. There is, however, a great difference between the sanitary conditions of different districts, and it is only in the poorer localities, where overcrowding is common and sanitary conditions are neglected, that a high rate of mortality uniformly prevails. The death-rate in these districts is especially unfavorable to children. Much has been done to mitigate this evil, and the sanitary arrangements enforced by the authorities are as efficient as in existing circumstances they can be made. The drainage also is good. The purification of the river has been taken in hand, and extensive works have recently been started by which a large quantity of sewage has its impurities removed before entering the Clyde. Glasgow has long been distinguished for the energy and public spirit of its local government. The trade and commerce of the city, its amenity, and its sanitary condition have all profited in turn by liberally conceived measures, successive provosts having vied in associating their reign with important schemes of improvement. The improvement of the navigation of the Clyde, which has been already alluded to, was the first and greatest of these schemes of local improvement. Within the memory of people still living the Clyde was fordable at and below the present harbor of Glasgow, where there is now a depth of 25 or 26 feet. In 1658 the magistrates of Glasgow wished to make a harbor at Dumbarton, but were opposed by the magistrates of that burgh, because the influx of mariners would raise the cost of provisions. In 1662 they purchased the ground on which Port Glasgow stands, on which they built a harbor and the first dry-docks in Scotland. In 1759 an act of Parliament was procured for making the river navigable by locks, which was fortunately abandoned. In 1770 an act was procured for deepening the river by dredging, and imposing tonnage dues. Since then the opening up of the river highway and the growth of the trade have progressed with uninterrupted success.

Up till 1804 Glasgow was supplied with water from 30 public and a few private wells. In 1806–1808 acts were obtained for supplying it with filtered water from the

Clyde, and this source of supply continued to be used till, from increasing population, the river had changed its character. In 1846 an additional supply was brought in by gravitation from the hills lying S. of the city. In 1855 an act was obtained for procuring a supply from Loch Katrine, at a distance of about 30 miles, and the new works were opened in 1859. The outlay on the new works was £930,668, and the purchase and improvement of existing works cost £658,153, making a total of £1,588,821. The rates provided by act of Parliament more than cover the interest on outlay and ordinary expenditure and supply a surplus for new works. The average daily consumption of water has risen from 19,170,000 gallons in 1861 to about 54,000,000 in 1899. By the same year good progress was made with important extensions of the Loch Katrine works, the intention being to raise the possible daily supply to 100,000,000 gallons at an additional expenditure of about £1,000,000. In connection with the water supply may be mentioned the supply of high pressure hydraulic power for elevators, etc. In 1866 an act was obtained for the improvement of the city, under which some £2,000,000 has been expended. With this and the Loch Katrine water scheme the names of Provosts Blackie and Stewart are respectively identified. The gas works belong to the corporation, and the gas is supplied at a low rate. The streets are now partially lighted by electricity, and the corporation has erected great power houses.

History.— Beyond its own commercial growth Glasgow has contributed little to general history. Although the most important city of Scotland, it has never been the capital of a county. Its local history is, however, peculiarly rich in characteristic incidents. Ancient Glasgow was situated on the high ground immediately around the cathedral, from which it first extended down to the river, and afterward spread in all directions, but chiefly W. and S. The city was for many centuries purely ecclesiastical. Its nucleus has been traced back as far as the origin of the bishopric founded by St. Mungo about 560. The convents of the Gray and the Black Friars had elegant churches attached to them, one of which at least is supposed to have been earlier than the cathedral. Rottenrow, Castle, Drygate, Kirk, High, Saltmarket, Gallowgate, Bridgegate, and Trongate streets are known to have been in possession of the public as early as 1100. The bishopric was refounded by David, Prince of Cumberland, in 1115. John Achius, his tutor, who was appointed bishop, is said to have begun the cathedral. In 1176 weekly markets and annual fairs were instituted by the prior of Grayfriars. The city was erected into a royal burgh in 1180. Provost and bailies are mentioned in a charter dated 1268.

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The corporation of fishers was probably the earliest trade incorporation. The first Stockwell street bridge was built by Bishop Rea in 1345. In 1350 St. Ninian's Hospital for lepers was founded. In 1393 a mint was erected in Drygate street. The tower of the cathedral was commenced by Bishop Lauder in 1408. In 1546 the shipping of Glasgow is mentioned in an order of the privy council. Some persecutions occurred in Glasgow during the period of the Reformation. The Confession of Faith was signed by 2,250 persons in 1581.

From this time till about the time of Cromwell's visit in 1650 the most powerful governing body in Glasgow appears to have been the session, which issued its orders on all manner of subjects with a refreshing ignorance and contempt of law. The General Assembly which abolished episcopacy met in Glasgow Cathedral in 1638. Until 1609 the provosts of Glasgow were country gentlemen. The Stuarts of Minto held the post for a good many generations. After the date mentioned the country provosts were succeeded by "creditable burgesses and trading merchants in the city." Two great fires devastated the city, in 1652 and 1657. Until the Union the trade of Glasgow was chiefly with the Continent. Its shipping in 1656 consisted of 12 vessels of 957 tons, in 1692 of 66 vessels of 1,182 tons. The Union opened up the trade with the American colonies, and when it was temporarily closed by the War of Independence the Glasgow merchants had already enriched themselves by the tobacco trade, and were able to turn their capital into new channels. The Govan colliery was opened in 1714. In 1748 the first delft works were erected, and in this works in 1763 Watt set up the model of a steam engine. The steam engine was introduced in a cotton mill in Glasgow in 1792. The power loom being now introduced, the city soon became an important center of the cotton manufacture. In 1816 the first vessel was dispatched to the East Indies. Since then the trade has extended all over the world, the improvement of the river keeping pace with this extension. The cotton manufacture reached its highest point about 1860, and since then has both actually and relatively declined, but shipbuilding, engineering, etc., have more than made up for this. In 1888 a highly successful exhibition was held, and in 1901 a still larger was opened. The progress of Glasgow will be seen from the following figures of population: 1610, 7,644; 1660, 14,678; 1708, 12,766; 1740, 17,034; 1763, 28,300; 1785, 45,889; 1801, 77,385; 1811, 100,749; 1841, 255,650; 1871, 477,732; 1881, 511,415; 1891, 565,714. Before the end of 1891 the boundaries were extended, and the population thus increased to 656,946; in 1906 it was 835,625, or with the adjoining suburbs, over 1,000,000.

Glasgow University

Glasgow University, a corporate body founded by a bull of Pope Nicholas V., dated Jan. 7, 1450–1451, as a "*studium generale tam in theologia et in jure canonum et civili quam in artibus et in quacunque licita facultate,*" with the power of creating masters and doctors, who, together with the readers and students, were to enjoy the same privileges and immunities with the University of Bologna. A body of statutes was prepared, and the university established by the bishop and chapter in the same year. The university appears at first to have had neither property nor endowment. A purse was formed of the perquisites procured from matriculations, examinations, degrees, etc., and some of the earlier members bequeathed the patronage of a few small chaplaincies; but through the zeal of its founders and the civil and ecclesiastical immunities accorded to it, the new school of learning prospered, though in circumstances so little in accordance with modern notions of educational requirements. The clergy were induced to attend by offers of exemption from taxation and residence.

The lectures in theology and in canon and civil law were read at the convent of the Dominicans; but the students of arts soon became so numerous that a house was provided for their residence called the pædagogium, and regular teachers were appointed. In 1460 James, Lord Hamilton, bequeathed to Duncan Bunch, regent of the College of Arts, and his successors, a tenement in High street, with four acres of land adjoining, for the use of said college. On this ground the classes of the university continued to meet for 410 years.

In 1577 James VI. prescribed rules for the government of the university, and made a considerable addition to its funds. This new charter is called the Nova Erectio. It provided for a principal to teach theology and Holy Scriptures, who was also professor of Hebrew and Syriac; and three regents, of whom one taught Greek and rhetoric; another dialectics, morals and politics, with arithmetic and geometry; the third, physiology, geography, chronology, and astrology. Between this period and the Restoration the university continued to flourish, and the number of its professors increased; but at the Restoration the reëstablishment of Episcopacy deprived it of a great part of its revenues, and three of its chairs fell into abeyance. After the Revolution it continued gradually to expand the scope of its teaching, and has numbered among its professors and graduates many distinguished men. In the end of the 18th century it obtained by bequest the valuable anatomical museum, library, and other collections of the famous Dr. William Hunter. Later the old buildings became quite inadequate, and were sold to the Union Railway Company in 1864 for £100,000. A grant of £120,000 for new buildings was procured from the government, a small sum was available from college funds, and public subscriptions were procured. In 1870 the classes and professors migrated to new buildings at Gilmorehill, which cost over £500,000, including £40,000 from the Marquis of Bute for the erection of a common hall; £70,000 under a bequest from Charles Randolph, and other sums. It has an annual government allowance of £20,880.

The University of Glasgow comprises five faculties, namely, arts, science, medicine, law, and theology, the faculty of science having been recently added. The oldest chairs are those of moral philosophy, 1577; natural philosophy, 1577; logic and rhetoric, 1577; Greek, 1581; divinity, 1630; Latin, previous to 1637; mathematics, revived 1691. In the first 20 years of the 18th century six professorships were either originally founded or revived, namely, Latin, Oriental languages, civil law, medicine, Church history, anatomy; astronomy was added in 1760. The remaining 18 professorships were founded in the 19th century. The university was reconstituted by the Scottish University Act, 1858, and a similar revolution was effected under the act of 1889.

The matriculated students for the session of 1909-1910 numbered 2,586. There are numerous bursaries connected with the university, the annual total value of which is about £8,000. There are also medals and prizes given in connection with the various classes, and scholarships or exhibitions are awarded to students who prove successful in certain examinations. The Snell exhibitions, established in 1677, send 10 (or fewer) Glasgow students to Oxford. They are tenable for five years, and each exhibition yields £80 per annum. The two Eglinton fellowships, founded in 1862, tenable for three years, and each worth £100 annually, are awarded by competition to students who have just graduated in arts. Three Euing fellowships, of the value of £80 per annum, and tenable for not more than five years, are also awarded by competition among graduates in arts. The Luke fellowship about £80 per annum, tenable for three years is awarded to graduates for excellence in English literature and history. The George A. Clark scholarships, four in number, are tenable for four years, their annual value being about £180. The examinations are respectively in classical literature, mental philosophy, mathematics, and natural science. The Metcalfe fellowship, founded 1870, annual value £100, tenable for three years, is designed to encourage studies in higher mathematics, practical astronomy, civil engineering, and chemistry. There is also the Black theological fellowship worth £140 annually.

Glass

Glass, a hard, brittle, transparent substance, formed by fusing together mixtures of the silicates of potash, soda, lime, magnesia, alumina, and lead in various proportions, according to the quality or kind of glass required.

Flint glass is used in making table ware and many articles of domestic furniture and fittings. The molten glass is taken from the pot by a ponty, and is blown or pressed into shape, or, by a combination of operations, is held in a mold while being blown.

Crown glass is taken by the ponty from the pot, and is then blown and whirled until it becomes globular. A ponty tipped with molten glass is applied to the bulb, the blowing tube detached, leaving a hole. The globe being again whirled, the glass flashes into a circular disk, adhering by a boss in its center to the ponty. Crown and flint glass are combined in the manufacture of achromatic lenses.

Sheet glass is glass withdrawn by the ponty from the pot and blown and whirled till it assumes a cylindrical form. The ends being cut off, and the cylinder slit longitudinally, the sheet is heated, pressed, and rubbed until it is flattened out. This is also called cylinder glass or broad glass.

Plate glass is made by pouring it upon a table which has a marginal edge of a height equal to that designed for the thickness of the glass. A roller travels over the table, on the ledges and flattening out the glass, which is thus made of equal thickness throughout.

Toughened glass is made by heating till it is about to soften, and then plunging it into a bath of oil at a greatly lower temperature. Usually a mixture chiefly of oily substances, such as oils, tallow, wax, resin, and the like, is put in the bath; and some manufacturers who worked the process, for a time dropped the newly-made glass vessels, while still hot, into the oleaginous mixture, by which plan neither reheating nor annealing by the ordinary process is required. After the articles acquire the temperature of the bath, they are removed.

Painted or stained glass is of two styles, enamel and mosaic glass. In enamel glass proper, certain fusible pigments are painted on a sheet of white glass, which is then fired and the result is a picture the tints of which even in the high lights are not wholly transparent. A modification of this method produces its picture partly by enameling on white glass, partly by the use of pot-metal glass the color of which is heightened or modified by the use of enamels. In this style, if any junction between two pieces of glass becomes necessary, the lead clams used for the purpose are studiously concealed by being made to run along other forms in the picture. The object of this enamel and semi-enamel glass painting is the closest possible imitation of an oil or water color picture; and the results of it are never satisfactory. Mosaic glass is made from a design wherein the drawing is given and the colors indicated, which is the working drawing of the glass painted. From this working drawing a kind of map is made which gives the various pieces of the mosaic. The glazier cuts these pieces out from sheets of glass of various colors, and hands them back to the painter, who proceeds first to paint the leading lines with a solid opaque enamel, the coloring matter of which is an oxide of iron. This being done, the pieces of glass are stuck together temporarily (by means of wax) on a glass easel, and the painter slightly shades his bold traced lines with the same opaque color; using sometimes washes, and sometimes hatching of lightly laid-on lines as in a black and white drawing on paper. Sometimes both washes and hatching are used, and the washed shadows are stippled. In any case the object of the method of shading is to keep the shadows as clear, and to dull the glass as little as the explanation or expression of the subject will admit of. Two or three or more firings are necessary during the process of this painting. This being done the glass goes back to the glazier's bench again, and he leads it up, and the window after having been solidified by a stiff cement or putty rubbed into the leaf of the leads, has then only to be put in its place and strengthened by the due iron stay bars. In this mosaic glass painting, so far from there being any necessity for concealing the leads it is desirable to break up the surface of the work by means of them, always taking care that their direction is carefully considered from the point of view of their appearance. Vagueness and blur are more out of place here than in any other form of art; and academical emptiness is as great a fault as these.

Of the origin of glass manufacture we cannot speak with certainty. Pliny states that the ancient Phœnicians discovered by a happy accident how to make it. He relates that certain Phœnician merchants preparing a meal upon the seashore set their cooking vessel on a mass of natron (sub carbonate of soda) and the union of the sand and alkali, when subjected to the fire, resulted in vitrification that drew the men's attention and led to subsequent efforts at imitation. According to Egyptologists the Egyptians made sham jewels of glass at least 5000 or 6000 B. C. In some of the most ancient tombs scarabs of glass have been found imitating rubies, emeralds, sapphires, and other precious stones, and the glass beads found broadcast in three parts of the globe were quite possibly passed off by traders on confiding barbarians as jewels of great price. As a medium of trade, beads are evidently

of great antiquity. Those known as aggry have been attributed to both Egyptian and Phœnician sources. The beads vary greatly in color and pattern and some of them show fine workmanship and marked beauty. During the period when Egypt was part of the Roman empire much glass was produced in the Nile valley.

It is probable that the great center of glass industry of mediæval and more recent times, Venice, received its early impulse and lessons from Constantinople. The art began there with the beginning of the city in the 7th century A. D. and there was a marked improvement after the conquest of Constantinople in 1204, and in 1291 the establishments were removed to the island of Murano, the manufacturers forming a guild with a register of nobility, and guarding their secret with the greatest jealousy. In 1436 their color glass came into note, and continued so till the close of the century; and in the 16th century lace patterns and mirrors were introduced. In the 15th and 16th centuries plain glass with tasteful ornaments in gilt and enamel, in the 16th, cracked lace and reticulated glass, and in the 17th century variegated or marbled glasses were produced.

The Venetian glass enjoyed for a long time the monopoly of commerce, and within recent years there has been a marked revival of the skill and enterprise of Venetian craftsmen. The forms of the Venetian glass reflected its Oriental origin, and the earlier glass of other countries of Europe in turn show the derivation of their art from Venice. In Germany the oldest glass dates from the 16th century, and consists of goblets and tankards of white color, enameled with colored coats of arms and other devices, millefiori, and schmeltz glass. Engraved glass was first introduced by Casper Lehman at Prague in 1609 under imperial protection, and continued by his pupil Schwanhard; and ruby glass by Kunckel in 1679. Glass is said to have been made in 1294 at Quinquengrone, in Normandy, and a common kind was made later in Dauphiné and Provence. In 1665 20 Venetian glass workers were brought by Colbert to Paris, where they set up the blowing of glass and the silvering of mirrors, the famous mirror hall in Versailles having been furnished by them. In 1688 an exclusive privilege of making large plates of glass by casting was conferred on Abraham Thevart. The name Thevart was assumed by a syndicate of capitalists formed to develop and work the invention of Louis Lucas de Nehon, who was the real inventor of plate glass and the founder of the Gobain works, one of the most extensive plate glass works in the world. In France oxide of lead flint glass was made at St. Cloud in 1784; another manufactory was subsequently established at St. Louis in 1790; and the St. Cloud establishment was removed to the vicinity of Mont Cenis, where it flourished till 1827.

It is uncertain whether glass was made in England before the 16th century, as that mentioned may have been imported from Flanders or Venice. In 644 Benedict Biscop introduced makers of glass windows into Northumbria; but window glass was not in general use for windows till the 15th century. Attempts were made to establish glass works at Jamestown, Va., in 1608–1622; at Salem, Mass., in 1639–1640; in New York city before 1664; and in Pennsylvania before 1683. Subsequently works were established in 1780 at Temple, N. H.; in 1792 at Boston; and in 1797 at Pittsburg. Plate glass was first made there in 1853, and it is also made at Baltimore and New York. Pressed glass was invented in the United States. See Glass Blowing: Glass Painting. George W. Hastings.

Glass Blowing, a mode of manufacturing various articles by taking a mass of viscid glass from the melting pot on the end of the blowing tube, and then inflating the mass by blowing through the tube, rolling on the marver, and exposing it at the furnace opening where its contained air is expanded and itself enlarged.

Although the forms into which blown glass is worked up are endless, the general methods of manufacture are the same, and a description of first-class lamp chimney works is illustrative of the blown glass industry in general. Perhaps the most important feature in the manufacture of lamp chimneys or indeed of any form of glassware, is the mixing of the ingredients. As in the case of plate glass, the body of the mixture consists of a sand which is as nearly pure silica as can be obtained. The sand is quarried from silica rock, then thoroughly ground and sifted through a 40-mesh screen, the material being received at the works in the prepared condition. The second most important ingredient is litharge; while potash and soda are used as fluxes. When the above mixture is used for the best quality of lamp chimneys, about 50 per cent. of the total is silica. The sand is melted in what is known as the furnace, a large conical structure which is fired by gas from beneath and contains some 14 to 16 large melting pots, which are molded from a specially prepared and very carefully kneaded pot clay. The melting pots are generally 44 inches in their largest diameter, and 50 inches in height. They are arranged in a circle within the furnace, each one opposite a door of the kind shown in our illustration. It takes 24 hours to melt the contents of a pot of the size just described. Ordinarily the contents are made

up of part of the prepared mixture and part cullett, *i. e.*, glass left over from previous days of operations.

The blowing is done with a long iron tube known as the blowpipe, which has a mouthpiece at one end, and is swelled out and thickened into a bell-mouth form at the lower end. In the process of blowing, the operator dips the thickened end into the melting pot and twists it around till it has gathered up a ball of molten glass of the desired size. The blowpipe is then withdrawn from the furnace and the ball of glass is rolled out to a conical shape on a plate and slightly inflated by blowing through the tube. The blowpipe is then handed to the second operator, who completes the operation of blowing. The bubble, if we may so call it, of glass, is thicker and heavier at its lower end, and to secure the elongated form necessary in lamp chimneys the operator swings the blowpipe to and fro, thus causing the bubble to stretch by its own weight. By thus alternately swinging and blowing he brings the bubble to the required length, and approximately to the required diameter, and then places it within a hinged mold, which is opened to receive it either by himself or one of his assistants. He then twists the pipe and blows at the same time, thus pressing the glass against the inner walls of the mold. The tube with the molded chimney attached is then withdrawn from the mold, and handed to another operator, who, with a pair of spring tongs, forms the flaring top of the lamp chimney and marks a sharp depression just outside its base where it is to be broken away from the blowpipe. Although a large amount of blowing is done by hand and mouth, increasing use is being made of what is known as the Owens blowing machine, which substitutes mechanical for hand power. This consists of a vertical stand, at the base of which is a circular table, carrying half a dozen of the hinged molds already referred to. After the first operator has blown and elongated the ball of glass to the desired shape, the blowpipes are placed in the mold, with the upper end of the tubes secured in a clamp near the top of the stand. To each of the tubes is connected a rubber hose, which is supplied with air from a small airpump located on and forming a part of the machine. The table with its blowpipes is rotated and air pressure is applied through the hose, half a dozen chimneys being thus blown and molded at the same time.

The chimneys are next carried to the annealing furnace. This is constructed with a metallic belt conveyer, that passes through the furnace from end to end. The chimneys are piled up thickly on this belt and carried through the furnace. The conveyer moves sufficiently slowly to subject each chimney to the heat of the furnace for from 12 to 24 hours. After annealing the chimney is cut down to length. This cutting is done by rotating the chimney horizontally above two fine transverse slits, through which a thin stream of hot air impinges on the glass at the point where it is to be cut through. The strain set up by this local heating is sufficient to enable the girl who attends the machine to break off the ends with a slight bending pressure. The chimney ends, after cutting, are sharp and rough, and it is necessary to give them the proper finish. The mouth of the chimney is smoothed by glazing, which is done by exposing it to the blast of a small gas-fired furnace till fusion of the edge takes place, the result being the smooth, rounded edge which characterizes the lamp chimney. In the case of chimneys with crimped edges, the crimping is done in a special machine which slightly flares and crimps the edges at one operation. The base is squared and smoothed down by grinding it on a circular, rotating, cast iron table, whose surface is covered with sand and water. The lamp chimneys are stood on end in small pockets formed in smaller disks, answering to the runners of a plate glass grinding machine, and are loaded with weights to give the proper pressure. After they have been ground they are taken to a stamping machine, where the maker's name is stamped on with a hydrofluoric acid preparation known as white acid. The chimneys are next taken to the labeling and packing room, where they are labeled, wrapped in paper, placed in separate cardboard boxes, and finally delivered to the packers. Such chimneys as are not shipped in boxes are packed loose with straw carefully worked around them. This packing is so successful that shipments of chimneys to such distant points as Africa and Australia are made with practically no breakage.

Glass Cavity, a cavity in a mineral containing a glassy substance; these cavities are sometimes found in crystals of leucite.

Glass Coloring, the act or art of tinting glass by incorporating metallic oxides in its substance; thus oxide of cobalt imparts a deep blue color; protoxide of copper, green; and oxide of gold, a ruby red. Colored glass is known as flashed, or as pot metal; in the former case a film of colored glass is laid over the white; in the latter the color is stirred up with the metal in the pot, imbuing its whole substance.

Glass Crab, a crustacean which received its name from its transparency, while, on account of its very much flattened and membranous body, it was called by Leach, *Phyllosoma.* It is now known to be an immature state of the *Podophthalmata.*

Glass Cutting, the art or process of cutting, shaping or modifying the surface of glass by mechanical means, as by revolving wheels of iron, stone, or wood supplied with

sand and water, or by means of a blast of air or steam carrying a stream of sand, which is directed upon the part to be cut or bored.

Glass Enamel, a term applied to a semi-lucid or an opaque glass which owes its milkiness to the addition of binoxide of tin. The transparencies which are hung in windows or form shades for lamps are of this semi-lucid character, and are miscalled porcelain transparencies. Watch dials have an opaque, glass-enameled face on a metallic backing.

Glassites, a religious sect which sprang up in Scotland about 1729, and was so called after its founder, the Rev. John Glass, who was originally a minister of the Church of Scotland, but was deposed by the General Assembly for holding opinions contrary to the standards of the Church. He explained his opinions in "The Testimony of the King of Martyrs concerning His Kingdom." He was opposed to all national establishments for the support of religion, and advocated a system of independent Church government. In fact, his views on this subject approached very nearly those maintained by the Congregationalists. One of his principal disciples was Robert Sandeman, who formed a congregation in London in 1762, and after him this sect in England bears the name of Sandemanians. The leading tenets of the Glassites, or Sandemanians, relate to the efficacy of the atonement and the nature of faith. They hold that "the bare death of Christ, without a deed or thought on the part of man, is sufficient to present the chief of sinners spotless before God"; and that "faith is no more than a simple assent to the divine testimony, passively received by the understanding." They maintain the necessity of a plurality of bishops, or teaching elders, in each church, but do not consider the want of learning, or employment in worldly business, any disqualification for the office. They also observed certain peculiar practices, supposed by them to have been prevalent among the primitive Christians; such as weekly sacraments, love-feasts, washing each other's feet, the kiss of charity, the use of lots; and in general, they attempted to carry out literally, as far as possible, the rules of Scripture.

Glass-maker's Soap, a name given to manganese, from its cleansing action in its association with glass-making materials. It is used to rid the materials of color arising from carbonaceous matters and protoxide of iron. An excess of it gives a purple tinge to the glass.

Glass Mosaic, an imitation of antique mosaic work, formed of small cubes of glass mixed with various coloring matters, chiefly metallic oxides, so as to form opaque colored enamels, which are cast into slabs or flat cakes, the slab being afterward cut into very small cubes or rectangular pieces. With these little colored cubes a picture is built up, by inserting each one separately in a bed of cement.

Glass Paper, a polishing paper made of paper thickly strewn with finely powdered glass. The fragments of broken wine bottles, etc., are carefully washed to remove dirt, the glass is crushed under a revolving stone and sifted into six sizes, as in manufacturing emery. It is sifted through sieves of wire cloth, which are generally cylindrical, like the bolts of flour mills. The cloths have from 16 to 90 wires to the inch. A surface of thin glue is spread on the paper, and the pulverized glass dusted over it with a sieve.

Glass Painting, the art of producing pictures on glass with vitrifiable colors, in contradistinction to the use of colored glass, in which the color forms part of the composition of the glass itself. Originally there was but one method of making ornamental glass windows, which was by the latter process; the pieces of stained or colored glass were cut to the desired shape, and let into the grooves of finely made leaden frames which formed the pattern in outline, so that the pictures resembled tables of mosaic work, on which there was no attempt at shading or modification of the tone. One of the best known of the early applications of glass to window decoration is that in the monastery of Tegernsee in Bavaria. These windows were executed in the latter half of the 10th century, and like all the work of that period, are of what may be called the geometric mosaic style. It was not till the 13th century that the mosaic patterns gave way to elaborate designs, not only in beautiful arabesque and other styles of decorative art, but even in pictorial composition. In all of these the figures, with the exception of the faces and hands, were made up of pieces of colored glass combined with great skill and taste. The faces and hands were painted in enamel colors, and burned in. Shading, properly so called, and half tints, are not attempted. The finest English examples are in Canterbury, Salisbury, and Lincoln Cathedrals, and the five sister lancets of York Minster. Gradually the art of shading by removing certain portions of the colored surface and other improvements were effected, and the 15th century may be called the culminating point in the history of the first period of the art. (See GLASS.)

The finest examples of mediæval glass painting are the windows of the N. aisle of the Cologne Cathedral. By the end of the 15th century Gothic architecture, which gave a great impulse to glass painting, was everywhere dead or dying, and the mediæval

spirit which inspired artists of Europe seems to have departed with it. It became the aim of the glass painters to rival the effects of oil paintings. Subjects in which were arranged a multitude of personages with all the elaborate artifices of pictorial composition; landscapes with the effects of aerial, and buildings showing complex linear perspective; foreshortened figures; the play of light and shade — all were attempted to be exhibited in painted windows, and the result was that what would have been impressive on a wall or canvas looked on glass a feeble and shallow transparency. It became apparent in a comparatively short time that the true art was lost, and though windows continued to be painted only a few artists acquired celebrity.

In the reign of James I., Bernhard von Linge, an artist from the Netherlands residing in England, and who may be considered the father of the modern art of glass painting, founded a school whose influence is evident in the works of the present day. There were some artists in the 17th and 18th centuries who gained reputation by their paintings on glass, as Eginton of Birmingham, Baumgärtner of Kufstein in the Tyrol, and their contemporary Jouffroy. The renovation of the art was contemporaneous with the revival of Gothic architecture in the beginning of the 19th century. A number of German artists — Mohn of Dresden, Scheinert in Meissen, and more especially Michael Sigm. Frank of Nuremberg — inaugurated the renaissance, which bids fair to rival the first period of the art. Through the generous assistance of King Louis of Bavaria a school was founded at Munich under the direction of Gärtner and Hess, which has obtained a world-wide celebrity. At the present day the chief seats of the art in Great Britain are Birmingham and Edinburgh; in France, Paris and Sèvres; and in Germany, Munich, Nuremberg, and Metz. There is a method now in practice of embossing or etching glass by means of asphaltum and fluoric acid; light and shade may be effected by this process by graduating the biting-in.

Glasspot, the pot in which the frit is fused into glass. They are made of pure refractory clay, mixed with about one-fifth its weight of old pots pulverized by grinding, are built up instead of being formed on a mold, and baked by being subjected to a white heat.

Glass Rope, a genus of siliceous sponges, consisting of a cup-shaped body affixed to a muddy part of the sea bottom by means of a rope of long twisted siliceous fibers.

Glass Snake, a lizard, of the family *Zonuridæ*, or *Chalcidæ*. From the absence of feet, they look like serpents. They are found in this country. The name glass snake is supposed to allude to the brittleness of their tail.

Glastonbury, a town of Somersetshire, England, 25 miles S. W. of Bath. It was the seat of the most magnificent and wealthy abbey in England, the last abbot of which was hanged for refusing to surrender it to Henry VIII. Its ruins are still extensive.

Glatz (gläts), a town of the province of Silesia, Prussia, on the left bank of the Neisse, 52 miles S. S. W. of Breslau. It has four Catholic churches. Its manufactures include linen, damask, and woolen fabrics, leather, and rose-garlands. During the Thirty Years' and Seven Years' Wars, Glatz was frequently besieged and taken, and therefore has some historical interest.

Glauber, Johann Rudolph (glou'ber), a German chemist; born in Karlstadt, in Franconia, in 1603. Although a believer in the philosopher's stone and in the elixir vitæ, he contributed very materially to the progress of chemistry. In 1648 he discovered hydrochloric acid while experimenting with oil of vitriol and common salt; he was probably the first to procure nitric acid; and his name has been transmitted in Glauber's salt, which he likewise discovered. He died in Amsterdam in 1668.

Glauber's Salt, sulphate of sodium, so called because of the importance attached to its chemical and medicinal properties by Glauber. It forms large colorless monoclinic prisms, which effloresce on exposure to the air. It is soluble in water, and when heated melts in its water of crystallization. It is found in many localities, both dissolved in the water of mineral springs and of salt lakes, round which it effloresces.

Glauberite, a monoclinic yellow, gray, or brick-red mineral, of vitreous luster and white streak; its hardness, 2.5-3; specific gravity, 2.64-2.85. Composition: Sulphate of soda, 51.1; sulphate of lime, 48.9 = 100. It occurs in New Castile in Spain, in Upper Austria, in Bavaria, in California, and in Peru.

Glaucine, the alkaloid contained in the leaves of *Glaucium flavum*. The leaves are macerated with acetic acid, then the juice is pressed out, boiled, filtered, and the filtrate treated with lead nitrate, which precipitates lead fumarate. The filtrate is treated with H_2S, then the glaucine is precipitated with tannin, and the precipitate decomposed by chalk. Glaucine crystallizes out of water in small crystalline scales; it is easily soluble in alcohol and ether. It forms crystalline salts.

Glaucodote, an orthorhombic, greenish, tin-white mineral of metallic luster and white streak; its hardness, 5; specific gravity, 6. Composition: Sulphur 19.4; arsenic,

45.5; cobalt, 23.8; iron, 11.3 = 100. It occurs in chlorite slate in the province of Huasco in Chile, also in Sweden.

Glaucoma (glâ′kō-ma), an opacity of the vitreous humor of the eye, characterized by a bluish tint seen from without, and the absence of the peculiar characters of cataract, which, in some respects, it resembles as regards the gradual obscuration of vision. It is an almost incurable disease.

Glauconite, an amorphous green opaque mineral, like earthy chlorite, with a dull or glistening luster; its hardness, 2; specific gravity, 2.2 to 2.4. It is a hydrous silicate of iron and potash. Composition: Silica, 49.3; alumina, 3.6; sesquioxide of iron, 22.7; protoxide of iron, 6.3; potash, 8.3, and water, 9.6. There are two varieties of it; the one the green earth of cavities in eruptive rocks, the other the green grains in greensand formation, or anything similar.

Glaucopicrine (-pī′krin), an alkaloid occurring in the root of *Glaucium flavum*. The root is exhausted with acetic acid, then precipitated with ammonia, redissolved in acetic acid, then precipitated with a solution of oak bark, and decomposing the precipitate with chalk, is crystallized out of ether. Glaucopicrine forms granular needles, which are soluble in alcohol and in water. When heated with concentrated sulphuric acid it gives a dark grass-green color. The salts of glaucopicrine are crystalline, and have a very bitter taste.

Glaucopinæ (-pī′nē), wattle-crows, a sub-family of *Corvidæ*. The bill is short; the culmen elevated and curved from the base; the upper mandible entire; the wings short, rounded; the tail lengthened, graduated, or cuneated.

Glaucus, a sea-god, who was at first only a fisherman, and whose oracles were highly prized by fishermen, according to the legends. Another Glaucus was son of Hippolochus and grandson of Bellerophon. He assisted Priam in the Trojan war, and was foolish enough to exchange his golden armor for the iron suit of Diomed. He displayed much courage, but was killed by Ajax. A third Glaucus was son of Sisyphus, King of Corinth, by Merope, daughter of Atlas, and born in Potnia, Bœotia. Desiring to make his mares swifter than others, for the purpose of vexing Venus, the latter inspired the animals with such fury that they tore Glaucus to pieces as he returned from the games which had been celebrated by Adrastus in honor of his father. A fourth Glaucus was son of Minos II., and Pasiphæ, was smothered in a cask of honey, and miraculously brought to life, by an herb sent by Polyidus the soothsayer.

In zoölogy, a genus of nudibranchiate gasteropods, family *Æolidæ*. The animal is elongated and slender, with the foot linear and channeled, the tentacles four, the gills slender, and supported on three pairs of lateral lobes, Known species, seven; floating on seaweed in the Atlantic and Pacific, their food being small sea-jellies.

Glaux, a genus of plants, order *Primulaceæ*, having a five-lobed calyx, no corolla, and a five-valved capsule, with about five seeds. *G. maritima*, sometimes called sea milk-wort and black salt-wort, is one of the most common plants of our seacoasts, growing in almost every muddy situation. It is a small plant, with branching stems, often procumbent, and small fleshy leaves. It makes a good pickle.

Glaze, a vitrifiable composition for covering earthenware or porcelain. Glaze on earthenware has several objects: to render the ware impermeable to liquids; to impart luster, and to preserve colors and patterns. In cookery the word is applied to the white of eggs, or strong gravy or jelly boiled down to the consistency of a thin cream, and used to cover pastry, with a glossy, shining coating. In painting it is used for any kind of varnish intended to preserve the picture from the effects of the atmosphere, and to add brilliancy to the colors.

Glazer, a cutler's or lapidary's wheel of a grade between the grinding and the polishing. It is made of disks of wood so arranged as to present the grain outwardly, that is, radially. The wooden surface is fed with emery cake. Mahogany, oak, apple, beech, or birch are employed. Other glazers have a covering of leather or a cap of lead or tin alloy to carry the emery for grinding or glazing cutlery. Also a calendering or calico smoothing wheel.

Glazier, Lake, a body of water in Minnesota, S. of Lake Itasca, into which it empties through a swift and permanent stream about six feet wide; named for Capt. Willard Glazier, who claimed for it a geographical importance as the true source of the Mississippi. Lake Glazier is in lat. about 47° 34′ N. and lon. 95° .02′ W.; is 1½ miles in greatest diameter; and has an area of 255 acres. It is estimated to be 1,582 feet above the Atlantic, and 3,184 miles from the Gulf of Mexico. The Minnesota State Historical Society sent an expedition to the region and published a refutation of Glazier's claims.

Gleaning, the act of gathering after reapers or gatherers, as the gleanings of grapes. Gleaning was an established practice among the Jews, and was sanctioned by the law of Moses, who enjoins them, when they reap the harvest, not wholly to reap the corners of the field, nor gather the gleanings, which were to be left for the poor and the stranger, as were also the gleanings of

the vineyard; for they were not to gather every grape (Levit. xix: 9, 10). In modern times there exists a very general feeling in favor of gleaning; and in France and England it is popularly regarded as a right which an owner or occupier cannot oppose, and that the poor who enter a field for this purpose are not guilty of trespass. The act, however, has been decided to be illegal, though the practice still prevails of allowing the poor to glean the fields after they are reaped. In the United States there is not, it is believed, any law on the matter.

Gleason, Elliott Perry, an American inventor; born in Westmoreland, N. H., June 27, 1821; received a common school education; was one of the first to manufacture gas burners; and invented the regulating argand burner and other lighting devices. He died Sept. 26, 1901.

Glebæ Adscripti (glē'bē ad-skrip'tī), in the Roman empire, from the 4th century onward, the cultivators of the soil, who, though personally free, were inseparably attached to the land they cultivated. They paid a fixed rent in kind to the owner of the domain, and, when he retained any land in his own hands, they were generally under the obligation to render him free a determinate amount of labor to till it. If the land was sold, they still remained attached to it. The Helots of Sparta were also *glebæ adscripti.*

Glebe, in the established Churches of England and Scotland, the land possessed as part of the revenue of an ecclesiastical benefice, usually along with a dwelling house. The incumbent may be regarded as the proprietor of the glebe for the time being, but he cannot alienate it. In Scotland, where lands are arable, the glebe must consist of four acres at least. The glebe must be taken as near the manse as possible.

Gleditschia, a genus of plants, order *Fabaceæ.* They are trees, with supra-axillary, branched spines; leaves abruptly pinnate and bi-pinnate, often in the same specimen. G. *triacanthus,* the honey locust, is a fine ornamental tree, native from Pennsylvania to Missouri, and now common in cultivation. Its branches are armed with stout, triple spines; leaflets alternate, oblong-lanceolate, obtuse, legume linear-oblong, compressed, intervals filled with sweet pulp. In favorable circumstances it attains the height of 70 feet, undivided half its length, with a diameter of 3 to 4 feet. The thorns, with which its branches are armed in a most formidable manner, are 2 to 3 inches long, ligneous, often having two secondary ones branching from the sides. Foliage light and elegant, the flowers are small, white, succeeded by flat, crooked hanging pods, 12 to 18 inches long, of a dull red. Seeds flat, hard, brown, imbedded in a fleshy substance, at first sweet, but becomes sour.

Glee, a musical composition for voices in harmony, consisting of two or more contrasted movements, with the parts so contrived that they may be termed a series of interwoven melodies. It may be written for three or more voices, either equal or mixed; but it is necessary that there should be only one voice to a part. It may be designed with or without instrumental accompaniment, and set to words in any style — amatory, bacchanalian, pastoral, didactic, comic, or serious. As a composition the glee appears to have historically followed the catch, and to have had its origin at the time when part-singing began to be revived.

Gleemen, itinerant minstrels, so called by the Anglo-Saxons; by the Latin writers of the Middle Ages they are termed joculatores. The name appears to have been supplanted by the Norman minstrels shortly after the Conquest.

Gleig, George Robert, an English writer; born in Stirling, April 20, 1796; entered the army, and served in Spain in 1813 and in America in 1814. He subsequently became inspector-general of military schools in 1846–1857, and chaplain-general of the army in 1846–1875. He deserves mention as the author of the story "The Subaltern" (1825), founded on incidents of the Peninsular war. He wrote several other novels, none equal to the first, and several volumes of military history and biography, as "Campaigns at Washington and New Orleans" (1847), lives of Warren Hastings (1841), Clive (1848), and Wellington (1862). He died near Winchfield, in Hampshire, July 9, 1888.

Gleim, Johann Wilhelm Ludwig (glīm), a German poet; born in Ermsleben near Halberstadt, April 2, 1719. Besides writing a good deal of moderate poetry, he won for himself the affectionate appellative of "Father Gleim," on account of the encouragement and assistance he lent to the poets of the day. His patriotic "Songs of a Prussian Grenadier" by their genuineness of feeling and force of expression rise above the general level of his other productions — odes in imitation of Horace and Anacreon, rhymed fables and romances, and songs. He died in Halberstadt, Feb. 18, 1803.

Glen, William, a Scottish song-writer; born in Glasgow, Nov. 14, 1789. He was trained to mercantile business, but preferred conviviality and the Muse. His fame rests upon his "Poems, Chiefly Lyrical" (1815); "Wae's me for Prince Charlie," a Jacobite song, is widely known. He died in Glasgow, December, 1826.

Glenalmond (-ä'mond), a valley of Perthshire, Scotland, much visited for its

scenery, and for Ossian's grave — the subject of Wordsworth's verses on the "Narrow Glen." It is the seat of Trinity College, Glenalmond (1847), whose buildings have been to some extent reproduced in those of Trinity College, Hartford, Conn.

Glencoe (-kō), a valley in the county of Argyle, near the head of Loch Etive, Scotland. It is bounded on both sides by almost perpendicular mountains over 3,000 feet high, and is traversed by a mountain stream, Ossian's "dark torrent of Cona." The valley was the scene of a tragedy known as the massacre of Glencoe. The state of the Highlands after 1690 was a subject of great anxiety to the government. Although the Highlanders had ceased any important operations since the death of Dundee at Killiecrankie, they had not laid down their arms. In 1691 a proclamation was issued promising pardon to all who should swear allegiance on or before Dec. 31, 1691. All the chiefs, with the exception of one Ian of Glencoe, complied. The latter had unfortunately exceeded the prescribed period, and a certificate which he produced to prove that he had offered to take the oaths at Fort William was suppressed, as is thought, by Stair. The king's signature was obtained to an order to extirpate the MacDonalds. On Feb. 1 a party of soldiers, 120 in number, commanded by Captain Campbell of Glenlyon, marched up the glen and took quarters as friends. The soldiers belonged mostly to the clan Campbell, enemies of the MacDonalds; but they were well treated, and all went merrily for 12 days. At 5 in the morning of the 13th Glenlyon and his men suddenly fell on the MacDonalds. Thirty-eight men were murdered, but many who had escaped perished in the snow, sank into bogs, or died for lack of food.

Glendalough (glen-dal'o), in Leinster, Wicklow co., Ireland, about 24 miles S. of Dublin; the vicinity is celebrated for its scenery and ruins.

Glendower, or **Glendwr, Owen** (glen'-dör), a Welsh chief; born in Montgomeryshire about 1354. He was made esquire of the body to Richard II., and remained with him till his deposition by Henry IV. in 1399, after which he retired into private life. Shortly after the accession of the new king part of Glendower's lands were seized by his neighbor, Lord Grey of Ruthin. Thereupon the Welshman, being unable to obtain redress from the English king, took up arms in his own cause, and in 1400 commenced operations by seizing the estates of Lord Grey. The king ordered his subjugation, and granted his estates to his brother, the Earl of Somerset. Then for two years Glendower carried on guerrilla warfare against the English marches. In 1402 he drew Lord Grey into an ambush, and took him prisoner. In this same year Sir Edmund Mortimer, the uncle of the Earl of March, was also captured by Glendower. Both Grey and Mortimer married daughters of the Welsh chieftain and with him formed the coalition with Harry Percy (Hotspur) against Henry of England. That coalition ended in the battle of Shrewsbury in July, 1403, in which the English king gained a decisive victory, Hotspur being among the slain. In June of the following year Glendower entered into a treaty with Charles VI. of France, who in 1405 sent a force to Wales to act against the English. Meantime, in the spring of 1405, Glendower had been twice severely defeated by Prince Henry of England. The Welsh prince nevertheless kept up a desultory warfare during the remaining years of his life. He never submitted to English rule, and is believed to have died peacefully in Monmouthshire after 1416.

Glenfinnan, a Highland glen in Inverness-shire, Scotland; 18 miles W. of Fort William. Here, on Aug. 19, 1745, the clans gathered under Prince Charles Edward's banner, and here in 1815 was erected to his memory a tower bearing an inscription in Gaelic, Latin, and English.

Glenlivet (-lē'vet), the valley of Livet Water in Banffshire, Scotland. The Livet runs 14 miles N. W. till, at a point 5 miles S. of Ballindalloch station, it falls after a total descent of 1,600 feet into the Avan, itself an affluent of the Spey. In the battle of Glenlivet or Alltacoileachan, Oct. 4, 1594, 10,000 Protestants under the Earl of Argyll were routed by the Catholic insurgents under the Earl of Huntly.

Glenroy (-roi'), a valley in the Highlands of Scotland, parallel to Glenmore in Lochaber, Inverness-shire. It is nearly 14 miles in length, and little more than ½ mile in breadth, and is celebrated for its so-called Parallel Roads which are three parallel terraces running along either side of the glen. Not only do the lines on the same side run parallel to each other, but on both sides they respectively occupy the same horizontal level. These terraces project, at some parts only a few feet from the hillside, and at others widen out so as to be a number of yards in breadth. The lowest terrace is 850 to 862 feet above the sea-level; the middle, 1,062 to 1,077 feet; and the highest 1,144 to 1,155 feet. Their origin has been much disputed, but according to Macculloch, Agassiz, Buckland, and Geikie, the roads are shore-lines of glacier lakes.

Glens Falls, a village in Warren co., N. Y., on the Hudson river, and on the Delaware and Hudson railroad; 54 miles N. of Albany. The river, here flowing through a

ravine, descends 50 feet over a precipice 900 feet long, from which the place derives its name, and supplies enormous water power. The city has extensive marble and limestone quarries, lime works, sawmills, shirt, paper, and collar factories, and lath and planing mills. There are a Union High School, Crandell Public Library, a summer school for teachers, Glens Falls Academy, electric lights and street railroads, waterworks, daily and weekly newspapers, 3 National banks, and an assessed property valuation of $6,250,000. Pop. (1890) 9,509; (1900) 12,613; (1910) 15,243.

Glentilt, a valley in Perthshire, Scotland; the deep narrow glen of the Tilt, which issues from Loch Tilt and runs 16 miles S. W. receiving tne larger Tarf Water and Fender Burn, until at Blair-Athole it falls into the Garry. Glentilt is classic ground to the geologist, as having furnished evidence for the Huttonian or denudation theory.

Gliddon, George Robbins, an American archæologist; born in Devonshire, England, in 1809. In early youth he was sent out to Egypt, where his father was established as a merchant, and also United States Consul at Alexandria. He ultimately succeeded his father as United States Consul, and resided for many years in Egypt and the Levant, actively prosecuting researches in the antiquities and ethnology of those countries. About 1840, he returned to Europe, whence he came to the United States, where he lectured in all the principal cities on Oriental archæology, and was appointed agent for the Honduras Interoceanic Railroad Company. His principal works are: "Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt" (1841); "Discourses on Egyptian Archæology" (1841); "Otia Ægyptica" (1849); "Ancient Egypt"; "Types of Mankind, or Ethnological Researches based upon the Ancient Monuments, Paintings, Sculptures, and Crania of Races, etc.," written in conjunction with Dr. Nott, of Mobile, Dr. Morton, Professor Agassiz, and others; and "Indigenous Races of the Earth, or new Chapters of Ethnological Inquiry." He died in Panama in 1857.

Globe, a sphere, a round solid body which may be conceived to be generated by the revolution of a semicircle about its diameter. Globe, or artificial globe, in geography and astronomy, is more particularly used to denote a globe of metal, plaster, paper, pasteboard, etc., on the surface of which is drawn a map or representation of either the heavens or the earth, with the several circles which are conceived on them, the former being called the terrestrial globe, and the latter the celestial globe. The celestial globe is intended as a representation of the heavens, on which the stars are marked according to their several situations. The terrestrial globe is an artificial representation of the earth, exhibiting its great divisions. The axis of the earth is an imaginary line passing through its center, and the wire on which the artificial globe turns represents this line. The poles of the earth are the extremities of this axis; that on the N. is called the arctic, that on the S. the antarctic pole. The brazen meridian is the circle in which the artificial globe turns, divided into 360 degrees. Every circle is supposed to be divided into 360 equal parts, called degrees; each degree into 60 equal parts, called minutes; each minute into 60 equal parts, called seconds, etc. A degree is therefore only a relative idea, and not an absolute quantity, except when applied to a great circle of the earth, as to the equator or to a meridian, in which cases it is 60 geographical miles or 69.12 English miles. A degree of a great circle in the heavens is a space nearly equal to twice the apparent diameter of the sun, or to twice that of the moon when considerably elevated above the horizon. Degrees are marked with a small cipher, minutes with one dash, seconds with two, thirds with three, etc.; thus 25° 14′ 22″ 35‴ are 25 degrees, 14 minutes, 22 seconds, 35 thirds. In the upper semicircle of the brass meridian these degrees are numbered 10, 20, etc., to 90, from the equator toward the poles, and are used for finding the latitudes of places. On the lower semicircle of the brass meridian they are numbered 10, 20, etc., to 90, from the poles toward the equator and are used in the elevation of the poles. Great circles, as the equator, ecliptic, and the colures, divide the globe into two equal parts; small circles, as the tropics, polar circles, parallels of latitude, etc., divide the globe into two unequal parts. Meridians, or lines of longitude, are semicircles extending from the N. to the S. pole, and cutting the equator at right angles.

Every place on the globe is supposed to have a meridian passing through it, though there may be only 24 drawn on the terrestrial globe; the deficiency is supplied by the brass meridian. When the sun comes to the meridian of any place (not within the polar circles) it is noon or midday at that place. The first meridian is that from which geographers begin to reckon the longitudes of places. In English maps and globes the first meridian is a great circle supposed to pass through the Royal Observatory at Greenwich. The equator, a great circle of the earth, equidistant from the poles, divides the globe into two hemispheres, Northern and Southern. The latitudes of places are reckoned from the equator N. and S., and the longitudes are reck-

oned on it E. and W. The equator, when referred to the heavens, is called the equinoctial, because when the sun appears in it the days and nights are equal all over the world, namely, 12 hours each. The declination of the sun, stars, and planets is counted from the equinoctial N. and S., and their right ascensions are reckoned on it E. around the celestial globe from 0° to 360°. The ecliptic is a great circle in which the sun makes his apparent annual progress among the fixed stars. It is the real path of the earth around the sun. The points at which the ecliptic intersects the equator at an angle of 23° 28′ are called the equinoctial points; the ecliptic is situated in the middle of the zodiac. The apparent path of the sun is either in the equinoctial, or in lines nearly parallel to it, and his apparent annual path may be traced in the heavens by observing what particular constellation in the zodiac is on the meridian at midnight; the opposite constellation will show very nearly the sun's place at noon on the same day. The zodiac on the celestial globe is a space which extends about 8° on either side of the ecliptic. Within this belt the motions of the planets are performed.

The ecliptic and zodiac are divided into 12 equal parts called signs, each containing 30°; and the sun makes his apparent annual progress through the ecliptic at the rate of nearly a degree in a day. The names of the signs and the days on which the sun enters them, are given in the article Ecliptic. The colures are two great circles passing, one through the points Aries and Libra and the poles of the world, the other through Cancer and Capricorn and the poles of the world. That passing through Aries and Libra is called the equinoctial colure; that passing through Cancer and Capricorn the solstitial colure. The tropics are two smaller circles, each 23° 28′ from the equator, with which they are parallel; the N. is called the tropic of Cancer, the S. the tropic of Capricorn. The polar circles are two small circles parallel to the equator (or equinoctial), at the distance of 66° 32′ from it, and 23° 28′ from the poles. The N. is called the arctic, the S. the antarctic circle. Parallels of latitude are small circles on the terrestrial globe parallel to the equator. Every place on the globe is supposed to have a parallel of latitude drawn through it. The hour circle of the artificial globe is a small circle of brass with an index or pointer fixed to the N. pole. The hour circle is divided into 24 equal parts, corresponding to the hours of the day, and these are again subdivided into halves and quarters. The horizon is a great circle which separates the visible half of the heavens from the invisible, the earth being considered as a point in the center of the sphere of the fixed stars.

Globe

Horizon when applied to the earth is either apparent or real. The sensible or visible horizon is the circle which bounds our view, where the sky appears to touch the earth or sea. It extends only a few miles. The real or true horizon is an imaginary plane passing through the center of the earth parallel to the sensible horizon. The wooden horizon circumscribing the artificial globe represents the true horizon on the earth. The horizon is divided into several concentric circles arranged in the following order: One contains the 32 points of the compass divided into half and quarter points. The degrees in each point are to be found in the amplitude circle. Another contains the 12 signs of the zodiac, with the figure and character of each sign; and another contains the days of the month answering to each degree of the sun's place in the ecliptic, and the 12 calendar months. The cardinal points of the horizon are E., W., N., and S. The cardinal points in the heavens are the zenith, the nadir, and the points where the sun rises and sets. The cardinal points of the ecliptic are the equinoctial and solstitial points, which mark out the four seasons of the year. The zenith is a point in the heavens exactly overhead and is the superior pole of our horizon. The nadir is a point in the heavens exactly under our feet, being the inferior pole of our horizon, and the zenith or superior pole of the horizon of our antipodes.

The pole of any circle is a point on the surface of the globe 90° distant from every part of the circle. Thus the poles of the world are 90° from every part of the equator; the poles of the ecliptic (on the celestial globe) are 90° from every part of the ecliptic, and 23° 28′ from the poles of the equinoctial; consequently they are situated in the arctic and antarctic circles. Every circle on the globe, whether real or imaginary, has two poles diametrically opposite to each other. The equinoctial points are Aries and Libra, where the ecliptic cuts the equinoctial. The point Aries is called the vernal equinox, and the point Libra the autumnal equinox. When the sun is in either of these points the days and nights on every part of the globe are equal to each other. The solstitial points are Cancer and Capricorn. When the sun enters Cancer it is the longest day to all the inhabitants on the N. side of the equator, and the shortest day to those on the S. side. When the sun enters Capricorn it is the shortest day to those who live in N. latitude, and the longest day to those who live in S. latitude. The latitude of a place on the terrestrial globe, or its distance from the equator in degrees, minutes, or geographical miles, etc., is reckoned on the brass meridian from the equator toward the N. or S. pole. The quadrant of altitude is a thin piece of brass divided upward

from 0 to 90°, downward from 0 to 18°; when used it is generally screwed to the brass meridian. The upper divisions determine the distances of places on the earth, the distances of the celestial bodies, their latitudes, etc.; and the lower divisions are applied to finding the beginning, the end, and duration of twilight. The longitude of a place on the terrestrial globe is the distance of the meridian of that place from the first meridian, reckoned in degrees and parts of a degree, on the equator. Longitude is either E. or W., according as a place is to the E. or W. of the first meridian. No place can have more than 180°, or half the circumference of the globe. Hour circles are the same as meridians. They are drawn through every 15° of the equator, each answering to an hour. The brass meridian and these circles always correspond.

A number of problems or questions, many of them more curious than useful, may be solved by means of a terrestrial globe. Among the most important are such as to find the latitude and longitude of a place, the distance between two places, the difference of time between two places, the time of the sun's rising and setting for a given day at a given place, etc. The shortest distance between two places is that portion of a great circle which passes through both that lies between them. This arc may be measured by a pair of compasses which are then applied to the equator or the brass meridian, in order to obtain the number of degrees comprised between them. Degrees of latitude may be converted into English miles by multiplying them by 69.12, the number of miles in a degree of latitude. The difference of time between two places is shown roughly by the hour circles. To find what time it is in Berlin, for instance, when it is 12 o'clock in London, bring London to the general meridian, set the index at 12, then turn the globe till Berlin comes to the meridian, when the index will point to the hour corresponding to 12 in London. To find the latitude turn the globe till the place comes to the graduated edge of the brazen meridian, and the degree on the meridian with which the place corresponds is the latitude N. or S., as it may be, of the equator. To find the longitude of any place, turn the globe till the place comes to the brazen meridian, and the degree on the equator intersected by the brazen meridian shows the longitude.

Globulin, crystallin, or vitellin, an albuminous substance first obtained from the crystalline lens of the eye. Globulin thus obtained is a yellowish transparent mass, which swells up and dissolves in water; the solution becomes opaline at 73°, and coagulates at 93°. Globulin is an albuminate which is soluble in a 10 per cent. aqueous solution of sodium chloride, and is reprecipitated by the addition of water, by long contact with which it loses its solubility with alkaline salts, and becomes similar to coagulated albumen. Vitellin can be obtained by treating the yolks of eggs with ether, and treating the residue with chloride of sodium solution and precipitating with water.

Globus Hystericus (his-ter'i-kus), a sensation in the early stages of hysteria, as if a ball or globe first rose to the stomach, then to the chest, and finally fixed itself in the throat with the ultimate sense of suffocation. It is produced by a spasmodic action of the glottis, preventing the escape upward of air which, being confined, distends the trachea or windpipe.

Glockerite, a brown, ocher-yellow, brownish-black, pitch-black, or dull-green mineral; massive, sparry, or earthy and stalactitic. Composition: Sulphuric acid, 15.9-15.19; sesquioxide of iron, 62.40-64.34; water, 20.7-21.7. Found near Goslar, in Hanover; also at Modum, in Norway.

Glockner, a mountain in Austria belonging to the Noric Alps, on the frontiers of the Tyrol, Carinthia, and Salzburg. It is 12,350 feet in height, and takes its name from the resemblance of the principal summit to a large bell.

Glommen, the largest river in Norway, issuing from Lake Aursund, at 2,339 feet above sea-level, and winding 350 miles to the Skager Rack at Frederikstad. Its course is interrupted by frequent waterfalls, the last, with a descent of 74 feet, being the Sarpsfos, 7 miles from the mouth. It is only navigable a few miles above and below Sarpsfos.

Gloria in Excelsis Deo, "glory to God in the highest," the initial words (sung by the angels when the birth of Christ was announced to the shepherds) of a short Latin hymn known as the greater doxology, and used in the service of many Christian Churches.

Glory of the East, the ancient Persepolis, noted for its wealth or magnificence.

Glory Pea, a leguminous plant, native of the desert regions of Australia. It is a low straggling shrub with light-colored, hairy, pinnate leaves, and large, brilliant scarlet flowers, the standard or banner petal of which appears in the form of an elongated shield with a dark brown boss in the center.

Gloss, the name is given to the interpretations or explanations of the Justinian code, which were generally written between the lines of the text and on the margin, and were hence called "glossæ interlineares" and "glossæ marginales." These glosses were sometimes held to be of equal authority

with the text itself. Accursius, who died about 1260, collected and arranged the glosses of his predecessors. The practice of introducing glosses was also adopted with the books of the canon law.

Glossanthrax (-an′-), a disease affecting herbivorous animals, especially cattle and horses. It is characterized by dark-colored carbuncles on the tongue.

Glossary, a vocabulary or dictionary of glosses, or explanations of words obsolete or rare, or occurring only in works of a special class as technical terms, or of provincial dialectal forms or words.

Glossitis (-sī-tis), inflammation of the tongue. Since mercury began to be less used for salivation, idiopathic glossitis has become rare. When it occurs, it is generally as a symptom of some other disease. The tongue when inflamed often becomes too large for the mouth.

Glossolalia (-lal′i-ä), the gift of tongues specially vouchsafed to the Church in early times. Since then it has been claimed for several Roman missionary saints, notably for St. Francis Xavier.

Glottis, the mouth of the wind-pipe. It constitutes a narrow aperture covered by the epiglottis when one holds his breath or swallows. It contributes by dilatation and contraction to the modulation of the voice. It is sometimes called the rima glottis, that is, the fissure or chink of the glottis.

Gloucester (glos′ter), a city and parliamentary borough, river port and county-seat of Gloucester co., England; on the left bank of the Severn, here divided into two channels inclosing the Isle of Alney and crossed by two fine bridges, 95 miles N. W. of London. It carries on a considerable shipping trade, the Gloucester and Berkeley canal giving access to the docks. The most remarkable public edifice is the cathedral; it was originally the church of a Benedictine abbey, dating from 1058, and was converted into a cathedral at the Reformation. It is cruciform, 444 feet in length, 154 in breadth, and 85½ in height, with a tower 230 feet high. It exhibits a great variety of styles, the choir with its roof of fan tracery being a fine example of Perpendicular Gothic. Other buildings are several handsome old churches, the shire hall, the guildhall, the bishop's palace, and county schools of art and science. The schools include the collegiate school founded by Henry VIII., the theological college, the blue-coat school founded in 1666, now known as Sir Thomas Rich's school, and the grammar school of St. Mary de Crypt, founded in the time of Henry VIII. The industries are rather varied. Pop. (1901) 47,943.

Gloucester, a city and port of entry of Essex co., Mass., and Massachusetts Bay, near the extremity of Cape Ann, and on the Boston and Maine railroad; 32 miles N. E. of Boston. It is one of the most important fishing ports and fish markets in the world, having over 500 vessels and 6,000 men engaged in the fisheries. Cod, haddock, halibut, herring, and mackerel are the principal catches. The Cape Ann granite quarries employ nearly 2,000 men, and supplied the granite for the postoffices at Boston and Baltimore and the East River bridge. The city is a popular summer resort, and has considerable historical interest. It was founded in 1623, principally by settlers from Gloucester, England, from which it received its name; was incorporated as a town in 1642; and became a city in 1874. It has the oldest Universalist Church in the United States, founded in 1770. There are the Sawyer Public Library, electric lights and street railroads, the Gilbert Hospital, Gilbert Home, Huntress Home for Aged Women, high school, daily and weekly newspapers, waterworks, 4 National banks, and an assessed property valuation of over $16,000,000. Pop. (1890) 24,651; (1900) 26,121; (1910) 24,398.

Gloucester City, a city in Camden co., N. J.; on the Delaware river and on the Atlantic City and the West Jersey and Seashore railroads; 3 miles S. of Camden. It has steam ferry connections with Philadelphia, and has electric lights and street railroads, waterworks, cotton mills, iron, terra cotta, and print works, the Welsbach gas light factory, and valuable fishing interests. There are weekly newspapers, savings banks, and an assessed property valuation of nearly $2,000,000. Pop. (1890) 6,564; (1900) 6,840; (1910) 9,462.

Gloucester, Dukes and Earls of. (1) Robert, Earl of Gloucester (died 1147), a natural son of Henry I., the principal supporter of his sister Matilda and her son Henry in their contest against Stephen for the English throne. (2) Gilbert de Clare, Earl of Gloucester (1243–1295), one of the most influential nobles during the reigns of Henry III. and Edward I. At first he sided with Simon de Montfort, and helped him to gain the battle of Lewes (1264); but afterward quarreling with Simon, he made common cause with Prince Edward and won for him the battle of Evesham (1265). (3) Thomas of Woodstock, Duke of Gloucester (1355–1397), the youngest son of Edward III., was from 1386 to 1389 the virtual ruler of the country. He was put to death by Richard II. at Calais in 1397, on the plea that he was plotting against the king. (4) Humphrey, Duke of Gloucester (1391–1447), fourth son of Henry IV., acted as protector of the

realm during the minority of Henry VI. He was arrested for high treason on Feb. 18, 1447, and five days later found dead in bed. He was a patron of learning, but reckless and foolish in his public conduct. (5) RICHARD, Duke of Gloucester, became KING RICHARD III. (*q. v.*). (6) HENRY, Duke of Gloucester (1639–1660), third son of Charles I. (7) WILLIAM, Duke of Gloucester (1689–1700), eldest son of Queen Anne. (8) WILLIAM HENRY (1743–1805), George III.'s brother, created Duke of Gloucester and Edinburgh in 1764. (9) His son, WILLIAM FREDERICK (1776–1834).

Glove, an article of dress; a covering for the hand. Its use reaches back to a remote antiquity, for we are told in the Odyssey that Laertes, the farmer-king, wore gloves to protect his hands from the thorns. Xenophon also sneers at the Persians for wearing gloves for keeping their hands warm. In their more robust days the Greeks and Romans scorned the use of gloves; but in later times they were used in Rome. The glove appears to have become a well-known article of dress in England about the 14th century, and corporations of glovers were in existence in the 15th century. In the days of Queen Elizabeth gloves were made with gauntlets upon which much rich and elaborate embroidery was worked.

Modern gloves are of two distinct classes, woven and knitted gloves, and those made of leather; and the making of these constitute entirely separate branches of manufacture. The manufacture of knitted or woven gloves is an industry allied to the hosiery trade, and the materials comprise all the ordinary fibers, the most important being silk and wool. In some cases these gloves are entirely made and finished by knitting; but in others, the pieces are separately fashioned and sewed together as in making leather gloves. The manufacture is widespread, but the headquarters of the thread and cloth glove trade are now Berlin and Saxony. The materials used for making leather gloves is principally the skins of deer, sheep and lambs, goats and kids, the latter being the most important, though far more "kid" gloves are made of sheep than of kid leather. The skins for military and other heavy gloves — doe or buck leather — are prepared by the ordinary process of tanning, or are a fine kind of chamois leather. Those for what are called dressed kid gloves are subjected to a special method of tanning, by which, under the influence of heat, and treatment with a mixture of flour, yellow of egg, and alum, the material is rendered peculiarly soft and flexible. After the leather has been properly prepared it is cut into pieces of the required size, then folded over somewhat unequally, as the back should be larger than the front. Three cuts are then made through the doubled piece to produce the four fingers; an oblong hole is cut at the bending of the fold for the insertion of the thumb piece; the cutting of this of the exact shape and size requires considerable skill. The first and fourth fingers are completed by gussets or strips sewed only on their inner sides, while the second and third fingers require gussets on each side to complete them. Besides these, small pieces of a diamond shape are sewed in at the base of the fingers toward the palm of the hand.

A kind of vice or clamp, with minute teeth to regulate the stitches, is used in the making of hand-sewn gloves, by which method all the finest gloves are stitched. Sewing machines are applied for the ornamental or embroidery stitching on the backs of fine gloves, and for almost the entire sewing of the cheaper and heavier gloves. The superiority of the French and the best English gloves depends chiefly on the adaptation of their shape to the structure of the hand by giving additional size where the flexure of the hand requires it.

Kid gloves are of two principal kinds, glacé and suède, according to the manner of dressing and finishing the leather used. Glacé gloves are those which are dressed, dyed, and polished on the hair or outer side of the skin, while suède gloves are carefully pared, smoothed, and dyed on the inner side of the skin for their purpose, and thus have the appearance of fine chamois. Paris and Grenoble are the chief seats of the French kid glove trade. Military gloves are made at Niort and Vendôme. Brussels and Copenhagen are also important glove-making centers. In England, Worcester is the principal seat of the glove industry; and in a specialty, the so-called English dogskin gloves made from tan skins of Cape sheep, the English manufacturers are without rivals. In feudal times the challenge to single combat was given by the casting down of the glove; and an ancient and more pleasing ceremonial still observed consists in the presentation of white gloves to a judge presiding over an assize at which no cases come up for trial. See GLOVERSVILLE.

Gloversville, a city in Fulton co., N. Y.; on the Fonda, Johnstown, and Gloversville railroad; 50 miles N. W. of Albany. It is celebrated for its manufacture of gloves, producing about two-thirds of the entire output in the United States. It contains the Nathan Littanuer Hospital, the Parsons Free Library, a high school, business college, a National bank, waterworks, electric lights and railroads, and daily and weekly newspapers; and has an assessed

property valuation of nearly $4,000,000. Pop. (1900) 18,349; (1910) 20,642.

Glow, in electricity, a pale blue luminosity appearing at the parts of an electric conductor from which electricity of high tension is noiselessly issuing, even though no other conductor is near.

Glow Worm, a beetle of which the male flies and does not shine, while the female shines and does not fly. It is from the latter sex, therefore, that the name glow worm has been derived. Probably the phosphoric light, which is intermittent, and can be displayed or withheld at the will of the insect, is used by the female to attract the male. It is displayed at the tail of the insect.

Gloxinia, a genus of plants, order *Gesneraceæ*. Some of the species are among the more popular flowers, and are well known to gardeners by their foxglove-shaped flowers of varied colors each standing on a separate stalk — in some forms with the opening of the tube directed downward; in others standing erect. The gloxinia generate buds from fragments of their leaves, under the hands of the cultivator.

Gluchov (glö-kov′), a town in the government of Tchernigoff, Russia; 112 miles E. of Tchernigoff. It has manufactures of soap, candles, and leather, and a considerable trade in grain. In the vicinity is the chief source for porcelain clay in the empire. Pop. (1890) 17,625.

Glucic Acid, an acid obtained along with saccharumic acid, by boiling cane sugar with dilute sulphuric acid; by boiling glucose with baryta water, the precipitate of the barium salt of saccharumic acid is filtered off, and the glucic acid precipitated by means of basic lead acetate, and the lead salt decomposed by H_2S. Glucic acid is a honeylike mass easily soluble in alcohol and water; it is decomposed by boiling with water, or with dilute acids into formic, acetic, and apoglucinic acids. When boiled with strong acids it is converted into humic acids; some chemists consider this acid to be identical with levulinic acid.

Glucina (-sī′nä), or **Glucine,** a sesquioxide of the metal GLUCINUM (*q. v.*) It is found associated with silica and alumina in the emerald, beryl, chrysoberyl, and euclase. It was at first mistaken for alumina, which it resembles in appearance, and in forming a gelatinous precipitate on adding ammonia, but it differs from it in being soluble in cold carbonate of ammonia, which is consequently used to separate the two. It was discovered in 1798.

Glucinum (-sī′num), an elementary metal, the base of the earth glucina. It resembles aluminum, and is prepared in the same manner. It is not acted on by water, fuses with difficulty, and when heated in the air, burns, producing glucina. It was discovered by Wöhler in 1828.

Gluck, Christoph Willibald (glök), a German composer; born in Weidenwang, July 2, 1714; studied music at Milan, under San Martini, and presented soon afterward several operas in theaters in Italy. Judging that his want of success was partially due to the weakness of the libretti, he conjoined with himself in his labors the poèt Ranieri di Calzabigi, and his next subsequent opera, "Helena and Paris," was received with tumults of applause. In 1774 he went to Paris, and presented there successively several masterpieces, as "Iphigenia in Aulis," "Orpheus," "Armidas," "Iphigenia in Taurus," "Alcestes." The composer Piccini having also presented an opera called "Alcestes," there arose between the two composers and their respective partisans a very animated quarrel as to the prëeminence of the two rivals, and of the style cultivated by each. He died in Vienna, Nov. 15, 1787.

CHRISTOPH GLUCK.

Glückstadt (glük′stät), a town in the province of Sleswick-Holstein, Prussia, on the Elbe river, 32 miles N. W. of Hamburg. Founded in 1616 by Christian IV. of Denmark, it is a pretty town, regularly built, and intersected by canals, its chief building the Rathhaus (1642; restored 1874). During the Thirty Years' War Glückstadt successfully withstood three sieges; its fortifications were demolished in 1815.

Gluconic Acid, an organic acid obtained by the oxidation of glucose with chlorine, or with bromine. Gluconic acid is a syrup; its alkaline salts are amorphous, and its barium and calcium salts are crystalline. It is insoluble in strong alcohol, and does not reduce Fehling's solution.

Glucosan, in chemistry, the anhydride of glucose, $C_6A_{10}O_5$. Obtained by heating glucose to 170°. Glucosan is colorless, with a faint, sweet taste; it is soluble in water and in alcohol; it does not ferment with yeast. By the action of dilute acids, glucosan is converted into glucose.

Glucose, a fermentable sugar, $C_6H_{12}O_6$, which occurs in two modifications, called dextro-glucose, or dextrose, and lœvo-glucose, or LEVULOSE (*q. v.*), according as it turns the plane of polarization to the right

or left. A solution of cane-sugar warmed with dilute acids, or left in contact with yeast, is converted into dextrose and levulose, $C_{12}H_{22}O_{11} + H_2O = C_6H_{12}O_6 + C_6H_{12}O_6$. These modifications can be separated, thus — 10 parts of the mixture of sugar are dissolved in 100 parts of water, and cooled with ice; then six parts of powdered calcium hydrate are added, the calcium compound of levulose is precipitated and separated from the soluble calcium compound of dextrose by strong pressure, washed, and decomposed by carbonic-acid gas. Levulose is more soluble in alcohol than dextrose. Both dextrose and levulose in contact with yeast undergo vinous fermentation, and when added to a solution of cupric sulphate, rendered alkaline by caustic potash, gives a dark-blue solution, which, when boiled, is reduced, cuprous oxide being precipitated as a red powder.

Glucosuria, a form of diabetes. The name has reference to the fact that the urine of persons affected with this disease contains sugar.

Glue, an impure gelatine. It is prepared from the clippings of hides, hoofs, and horns. These are steeped for several days in lime-water, to remove the hair and blood, and then drained and dried in a current of air for some days, that the lime may absorb carbonic acid, and thus prevent the injurious effects of the alkali upon the gelatine. They are then boiled in water until the solution is found to gelatinize firmly on cooling. The impurities are allowed to settle, after which it is allowed to gelatinize in shallow wooden boxes, cut into slices and dried upon nets. Good glue is semi-transparent, and free from spots and clouds. When wanted for use, it is broken in pieces and steeped in cold water till it softens and swells. It is then melted over a gentle fire, or, what is better, in a water bath, and applied in a liquid state with a brush. As the stiffening of glue depends on the evaporation of its superfluous moisture, it will not harden in a freezing temperature. Marine glue is a composition used for cementing materials that are exposed to moisture. It is made by dissolving 1 part of india-rubber in 12 parts of mineral naphtha, and adding 20 parts of powdered shellac. It not only resists wet, but cements glass and metals as well as wood. White fish-glue, or diamond cement, is made of isinglass dissolved in alcohol.

Glukhof. See GLUCHOV.

Glume, or **Gluma,** the exterior series of scales constituting the flower of a grass. It consists of empty bracts. The name was given by Linnæus and adopted by Lindley.

Glumella, a name given by De Candolle and Desvaux to two bracts within the glumes of a grass; the other name being pale. In one of the bracts the midrib quits the blade a little below the apex, and is elongated into an awn, arista, or beard, while the other bract which faces the fruit has its back to the rachis, is bifid at the apex, has no dorsal veins, and has a rib on each side of its inflexed edges. These two bracts are called by Linnæus the corolla of the grass, by Jussieu the calyx, by Robert Brown the perianth, and by Lindley and others its paleæ.

Glum Eyjolfsson (glöm ī′yōlf-sōn), an Icelandic bard; born about 940. His youth was spent in Norway. He is specially famed for the brave fight he waged in the S. W. part of his native island, the particulars of which he recounted in a poem or saga, orally transmitted to posterity till it was put in writing in the 13th century. Shortly before his death he became a Christian. His legend is variously known as the "Viga-Glumssaga," the "Glumssaga," etc. He died about 1003.

Glutamic Acid, an acid obtained by boiling vegetable gluten with dilute sulphuric acid, or casein with hydrochloric acid and stannous chloride. It is best prepared by boiling the gluten with 82 per cent. alcohol, which extracts the mucin, and boiling for 24 hours, with an inverted condenser, one part of the mucin with three parts of sulphuric acid and six parts of water; it is then filtered, saturated with chalk, filtered and evaporated to one-third of its bulk; the calcium salt is decomposed by oxalic acid, the excess of oxalic acid is removed by carbonate of lead, and the excess of $PbCO_3$ by H_2S gas, and, the filtrate evaporated, tyrosin crystallizes out, and afterward the glutamic acid, which crystallizes out of hot water in tetrahedral crystals, which are nearly insoluble in alcohol and in ether, melt with partial decomposition at 140°. Glutamic acid forms crystalline compounds with acids, and also forms salts. The barium salt gives characteristic needle groups like wawellite.

Glutanic Acid, an acid obtained by passing nitrous gas into a solution of glutamic acid in nitric acid, or by acting on a dilute solution of glutamic acid in hydrochloric acid by potassium nitrite, evaporating on a water bath and slaking out with ether. It forms small crystals, which melt at 72°. When heated to 190°, the anhydride is formed. Heated with hydriodic acid to 120°, glutanic acid is reduced to normal pyrotartaric acid. Glutanic acid forms crystalline salts, called glutanates, which are only slightly soluble in cold water.

Glutaric Acid, normal pyrotartaric acid, $C_5H_8O_4$, or $HO{\cdot}OC{\cdot}CH_2{\cdot}CH_2{\cdot}CH_2.CO{\cdot}OH$. It is obtained by heating glutanic acid with hydriodic acid to 120°; or by boiling for four hours one volume of normal pro-

pylene cyanide $CH_2 \cdot (CH_2 \cdot Cn)_2$ with a volume and a half of fuming hydrochloric acid, evaporating on a water bath and extracting with absolute alcohol; or by treating ethyl sodaceto-acetate with ethylic beta iodopropionate, and decomposing the resulting ethylic aceto-glutanate with concentrated alcoholic potash. Glutaric acid crystallizes out of water in large transparent monoclinic prisms, which melt at 97.5, and distill at 304°; it is easily soluble in water, alcohol, and in ether. It forms crystalline salts called glutarates. Glutaric anhydride, $C_5H_6O_3$, is obtained by the action of acetyl chloride on the silver salt, or by slowly heating the acid at 230° to 280°. It forms fine needles, which melt at 56°, and are only slightly soluble in cold ether.

Gluten, an albuminous substance, obtained by mixing 10 parts of wheat-meal with 8 parts of water, and allowing it to stand for half an hour; it is then washed with water, and kneaded, till all the starch is washed away, and the gluten thus obtained is a tenacious, yellowish-gray, elastic mass, which dries into a horny, semi-transparent mass, resembling glue. Gluten is soluble in dilute acids, but is nearly insoluble in water. Moist gluten putrefies when exposed to the air, unless it is quickly dried. Gluten is partly soluble in 80 per cent. alcohol; the portion insoluble in alcohol is called vegetable fibrin. The alcoholic solution contains mucin and glutin, or vegetable gelatine.

Gluteus, or **Glutæus,** three muscles of the hip, the *G. maximus*, the *G. medius*, and the *G. minimus*. The first is a very large and coarsely fasciculated muscle, which makes the buttock prominent in man; its use is to extend the thigh. The second is smaller; it is partly covered by the muscle already mentioned, and acts when one stands. The third is the smallest; it is covered by the second one, and acts as an abductor of the thigh.

Glutin, or **Glutine,** vegetable gelatine. It is obtained along with mucin by heating gluten in small fragments, with alcohol of 80 per cent., and then with alcohol of 70 per cent.; the alcoholic solutions are united, and the half of the alcohol distilled off. On cooling it deposits a mixture of glutin and mucin. The deposit is dissolved in 50 per cent. alcohol, and filtered through calico while hot, and then agitated till it is cold; most of the mucin is precipitated, the filtered liquid is evaporated in a water bath, and the glutin dissolved in alcohol. Glutin containing water is a fluid resembling a yellow varnish. Absolute alcohol precipitates it as a solid yellow-white substance, which can be dried over sulphuric acid; when rubbed dry, glutin becomes electric. Glutin is soluble in alkalies, and in dilute hydrochloric acid, and acetic acid. The chemical formula of glutin is not known. The analysis gave: Carbon 52.7, hydrogen 7.1, nitrogen 18.0, and sulphur 0.9 per cent.

Glutton (*Gulo*), a genus of carnivorous quadrupeds distinguished by the head being but moderately elongated and the body long in proportion to its height from the ground. The ears are rounded and very short. There is a simple fold of the skin below the tail, instead of the pouch observable in the badger, to which animal it bears some resemblance. It may in fact be considered as intermediate between the true plantigrade and digitigrade animals. Desmarest describes four species, one of which the *G. borealis*, Nils., or wolverene, is an inhabitant of the N. parts of America (*G. luscus*, Sabine). The wolverene is about 28 inches in length from the tip of the nose to the origin of the tail, which latter is about 8 inches, if the hair at the extremity be included, which is from 3 to 4 inches long. The whole body is covered with very long and thick hair, which varies in color according to the season or other circumstances. Its summer coat is generally as follows: Face blackish as high as the eyebrows, and between these and the ears whitish or brownish; ears covered with coarse hairs; the lower jaw and the inside of the fore legs spotted with white; upper part of the back, thighs, and under part of the belly, brown or brownish black; sides, chestnut color. Its fur is of considerable value and is much used in the N. parts of Asia, of which the wolverene is also a native, for making and ornamenting robes. The animal, however, does not breed in sufficient numbers to furnish any great collection to the fur traders. It is very voracious, but at the same time slow and heavy in its motions, though it is remarkably acute in its sight and hearing. It is amazingly powerful and an overmatch for any animal of its own size. It makes a strong resistance when attacked. If it can lay hold of it, it will tear the stock from a gun and pull to pieces the traps in which it is caught. It has been stated by persons who are familiar with its habits that it will lurk on a tree and drop on a deer passing underneath and fasten on it, drinking the blood till the unfortunate animal dies from exhaustion. It is one of the most destructive quadrupeds found in the N. part of America, destroying great numbers of young foxes and other animals; it is also a great enemy to the beaver, watching them as they come out of their houses, or even breaking into their habitations. Among other fabulous accounts of this animal is that given by Olaus Magnus, that it eats so voraciously that it is forced to go between two trees in order to force out part of the food.

Glyceria, in botany, manna grass, a genus of grasses, tribe *Festucæ*, family *Bro-*

midæ. The glumes are convex, five to seven nerved, the tip acute or obtuse.

Glyceric Acid, a thick syrup, obtained by the slow action of fuming nitric acid on glycerin, the two liquids being separated by a layer of water; it is soluble in alcohol and in water. When boiled with concentrated caustic potash, it yields oxalic acid and lactic acid. When fused with caustic potash it is decomposed, acetate and formate of potassium being formed; by the action of concentrated hydriodic acid it yields beta iodopropionic acid. By the action of PCl_5 it is converted into dichloropropionyl chloride, $CH_2Cl \cdot CHCl \cdot CO \cdot Cl$. Glyceric acid yields crystalline salts called glycerates. Glyceric acid heated to 105° for 10 hours yields an anhydride which crystallizes out of water in thin needles, which are insoluble in cold alcohol. They decompose at 250° without melting.

Glycerin, or **Glycerine,** a triatomic alcohol of the fatty series, $C_3H_8O_3$, or $CH_2(OH\cdot)\cdot CH(OH)\cdot CH_2(OH)$. Glycerin was discovered in 1778 by Scheele, who obtained it in the preparation of lead plaster by saponifying lard with oxides of lead. Glycerin occurs in most natural animal and vegetable fats in combination with fatty acids, from which it can be obtained by saponifying with alkalies. It is also formed during the alcoholic fermentation of sugar. Pure glycerin is obtained by heating neutral fats in a still, with a condensing apparatus, and passing steam in small jets through the melted fat, the temperature being kept below 600° F., and above 550° F.; the fat acids separate out in the receivers from the glycerin and water; the glycerin is then concentrated by evaporation. Glycerin is a thick, colorless, inodorous, neutral syrup, which has a very sweet taste; it mixes with water in all proportions, is soluble in alcohol and in chloroform, but insoluble in ether. It can be obtained by freezing, in deliquescent rhombic crystals, which melt at 17°. Glycerin boils at 290°; it is very hygroscopic; heated to 150° it burns with a bluish flame. Glycerin dissolves iodine and many metallic oxides and salts, also salts of the alkaloids. The specific gravity of glycerin is 1.26 at 15°, compared with water at 4°. Glycerin distilled with phosphorous pentachloride, P_2Cl_5, yields acrolein. By the action of a mixture of equal parts of concentrated nitric acid and sulphuric acid, it is converted into NITROGLYCERIN, $CH_2\cdot O\cdot(NO_2\cdot)\cdot CH\cdot O(NO_2)\cdot CH_2\cdot O(NO_2)$ (*q. v.*). Glycerin is used for preserving fruits, also as a solvent for various salts, and in preparing copying-ink; also as a lubricator for machinery and clockwork, and is placed over water in gas meters to prevent freezing, and is used for filling floating compasses. It is employed in the form of nitroglycerin in the preparation of dynamite, and for mixing with soap to form glycerin soap, which tends to soften the skin. Glycerin is often used to adulterate wine beer, milk, etc. Its presence can be detected by evaporating the liquid to dryness on a water bath, and extracting the residue with alcohol; the alcoholic solution is then evaporated and caustic soda added till it is slightly alkaline; a little of this solution placed on a watch glass and powdered borax added, glycerin, if present, will set free the boracic acid, which gives a characteristic green color when introduced into a flame on a platinum wire.

Glycerin is used on account of its physical properties as an adjunct to lotions in skin diseases to prevent the surface becoming dry. It can be used as a substitute for sugar in the diet of diabetic patients. It is often adulterated with glucose and cane sugar, which can be detected by expelling the water by heat, and treating with chloroform, which dissolves the glycerin and leaves the sugar as an insoluble residue.

Glyceryl Oxide, in chemistry, glyceryl ether $(C_3H_5)_2O_3$. It is obtained by distilling glycerin with calcium chloride. It is a colorless oily liquid, boiling at 172°. It mixes with water, alcohol, and ether. Heated with water in a sealed tube at 100° it is converted into glycerin; it unites with bromide, forming dibromhydrin. It is not attacked by sodium amalgam; it is oxidized by chromic acid mixture, yielding formic acid and acetic acid.

Glycine (glis'i-nē), in botany, the typical genus of the sub-tribe *Glycineæ* the species, all but one of which are decumbent if not even twining, have alternate leaves with axillary racemes or fascicles of yellow flowers. Locality, the warmer parts of the Old World. *G. soja,* the erect species alluded to, is cultivated in the East Indies for its beans. From these the Japanese make a sauce called sooja or soy.

Glycocholic Acid, an acid occurring as a sodium salt in the bile of most animals. It is obtained by covering fresh bile in a tall glass cylinder with a layer of ether, and adding 1 c. c. of strong HCl. to every 50 c. c. of bile; in a few days a crystalline mass is formed, which is filtered, washed with cold water, and crystallized out of boiling water; it forms fine needles, which melt at 100°, and are soluble in alcohol; when boiled with baryta water, it is decomposed into cholic acid and glycocine, $C_{26}H_{43}NO_6 + H_2O = C_{24}H_{40}O_5 + C_2H_5NO_2$. On adding to a solution of an alkaline glycocholate a few drops of a solution of sugar, then a drop of strong sulphuric acid, a red to a violet color is produced. Glycocholic acid forms salts which are called glycocholates; the glycocholates of the alkalies and earth metals are soluble in water and in alcohol. Glycocholate of sodium is precipitated from

its alcoholic solution by ether; acetate of lead gives a precipitate which is soluble in alcohol.

Glycodrupose (glī-kō-drō′-), in chemistry, the strong concretions in pears, produced by thickening and hardening of the cell walls, consists of this substance, together with a small quantity of mineral matter, which is removed by digesting them with dilute acetic acid. Glycodrupose is insoluble in water, alcohol, and ether; boiled with dilute nitric acid it yields cellulose and oxalic acid; boiled with dilute hydrochloric acid it yields drupose and glucose.

Glycon (glī′kon), an Athenian sculptor known by his colossal marble statue of Heracles, commonly called the "Farnese Hercules," now in the museum at Naples. He probably lived in the 1st century B. C.

Glyconian, or **Glyconic**, a name given to a certain kind of verse in Greek and Latin poetry. It consists of three feet, a spondee, a choriamb, and a pyrrhic: ¯ ¯ | ¯ ˘ ˘ ¯ | ˘ ˘; or it may be scanned as a spondee and two dactyls : ¯ ¯ | ¯ ˘ ˘ | ¯ ˘ ˘.

Glycyrrhetin (glī-sir-rē-), a brown brittle resin, obtained by boiling glycyrrhizin with dilute acids; insoluble in water, soluble in alcohol and alkalies. It dissolves in concentrated sulphuric acid, forming a red solution which changes to purple.

Glycyrrhiza (glī-sir-riz′ä), a genus of papilionaceous plants, sub-tribe *Galegeæ*. It has a tubular, five-cleft and two-lipped calyx, and an ovate compressed one to four-seeded pod. *G. glabra* is said to furnish the Spanish licorice. The roots of *G. echinata* and *G. glandulifera* are alleged to have the same qualities. Also in pharmacy, licorice root. The recent and dried root or underground stem of *G. glabra*. It occurs in cylindrical branched pieces, brown on the surface and yellow within, tough and pliable, sweet and mucilaginous to the taste. It contains a substance called glycyrrhizin, also asparagine, gum mucilage, etc. It is used as a powder in pills, and also to form extract of licorice, which is obtained by maceration and percolation of the root, and evaporation to a proper consistence. It is a sweet demulcent, useful to relieve coughing and to sheathe the mucous membrane. It is often given with powdered senna.

Glycyrrhizin, a crystalline substance obtained by boiling the root of *G. glabra* in alcohol, and evaporating the alcoholic solution to dryness. It is decomposed by boiling with dilute acids into glucose and glycyrrhetin. When fused with caustic potash it is converted into para-oxy-benzoic acid.

Glyoxalic Acid, also called glyoxylic-acid, $C_2H_2O_3$ or $\begin{matrix}CO\cdot H\\CO\cdot OH\end{matrix}$ a dyad compound, containing an aldehyde and an acid radical. Obtained along with glyoxal by oxidation of ethyl-alcohol with nitric acid; also by heating at 140° one part of dichloracetic acid, $CHCl_2\cdot COOH$, with 10 parts of water for 24 hours. Glyoxalic acid is a thick syrup, which can be crystallized over H_2So_4. It is very soluble in water, and can be distilled in a current of steam. It is a monobasic acid, forming crystalline salts called glyoxalates. By oxidizing agents it is converted into oxalic acid; by nascent hydrogen it is reduced to glycollic acid. It has also the properties of an aldehyde, reducing ammoniacal solutions of silver salts, forming a metallic mirror; also unites with alkaline bisulphites. Glyoxalic acid, when boiled with excess of lime water, yields calcium glycollate and calcium oxalate.

Glyphipterygidæ (glif-ip″te-rij′i-dē), a family of moths, group *Tineina*. The imago has the head generally smooth; the labial palpi variable; the maxillary palpi very short, the anterior wings oblong or elongate; the posterior ones ovate or lanceolate; the flight diurnal. The larva has 16 legs or is apodal. It generally mines in leaves.

Glyoxaline, in chemistry, a substance obtained by treating glyoxal, kept cool on ice, with a slight excess of ammonia, glycosine separates as a powder, the filtered liquid is boiled with milk of lime, evaporated to a syrup, and extracted with alcohol, and distilling the alcoholic solution. Glyoxaline crystallizes in white prisms which melt at 89° and boil at 255°. It is soluble in water, alcohol, and in ether. It unites with acids to form crystalline compounds.

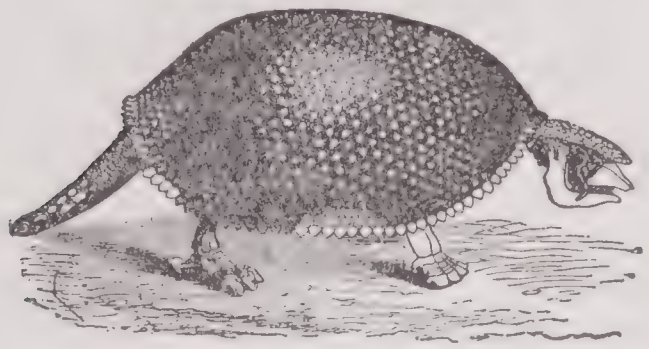
Glyphography, a name given by Mr. Palmer to his relief line engraving. A thin ground of wax is spread on the plate; this is etched or cut away so as to give the design in intaglio. The ground is now covered with a film of graphite, after which metal is precipitated on the metal in an electro-bath, giving a metallic plate with the design in relief. The copper shell is backed with lead and used as an ordinary printing surface.

Glyptodipterini (-ī′nī), in the classification of Professor Huxley, a family of fossil ganoid fishes, sub-order *Crossopterygidæ*. There are two dorsal fins, the scales are sculptured, the pectoral fins acutely lobate, dendition dendrodont. There are two sub-families, the one with rhomboidal, and the other with cycloidal scales. Under the latter family fall the genus *Holoptychius*, etc.

Glyptodon, a huge fossil mammal, family *Dasypodidæ* (armadillos). It was encased in armor, there being bony plates on

the head, and nearly hexagonal bony scutes on the body. It belongs to the Post-pliocene of South America. Including the tail, *G. slavipes* was more than nine feet long.

Gmelina (me-lī′nä) (named after Johann Georg Gmelin), a genus of *Verbenaceæ*, tribe *Viticeæ*. The leaves of *G. parviflora* render water mucilaginous. It may then be employed as a ptisan for the cure of ardor urinæ.



GLYPTODON SLAVIPES.

Gmelinite (mel′i-nīt) (named after Prof. Charles Gmelin), a colorless, yellowish-white, greenish-white, or reddish-white, fresh, transparent to translucent, brittle mineral, crystallizing in rhombohedrons. Hardness, 4.5; specific gravity, 2.04–2.17. Composition: Silica, 46.37–53.71; alumina, 17.62–21.48; lime, 3.67–11.48; soda, 3.10–7.29; potassa, 0.39–1.87; water, 8.58–29.41. Sarcolite, lederevite, and hydrolite are varieties. Found at Andreasberg, in the Harz; at Montecchio, Maggiore, and Castel, in the Vincentine; in Cyprus; near Cape Blomidon, in Nova Scotia, etc.

Gnaphalium (na-fā′li-um), the life-everlasting, a genus of plants, order *Asteraceæ*. *G. polycephalum*, the cotton-weed, common in fields in the United States, is distinguishable by its strong, agreeable odor, and its brownish color. Stem one-half foot high, whitish, with a cottony down, much branched; leaves sessile, cottony beneath; flowers in crowded clusters at the ends of the branches; involucre with whitish scales and yellow flowers.

Gnat (nat) a genus of dipterous insects represented by numerous widely distributed species, and specially abundant in marshy districts. There are nine British species, of which the common gnat (*Culex pipiens*) may be taken as typical. The color of the middle portion of the body on the upper surface is yellowish-brown, marked with darker longitudinal lines; the posterior part is light gray. The abdomen is long, slender, and slightly flattened; the legs very long and thin; and the delicate glassy wings bear numerous hairs on the veins and along their posterior margins. When the insect is at rest the wings are laid flat back on the body. The antennæ consist of 14 joints, and bear circlets of hair, which, in the male, may be so long and thick as to give a feathery appearance. The female is furnished with mandibles which are absent in the male. The male gnat sips nectar from the flowers and passes his days in dancing in the sunlight; the female spends her days and nights in pursuit of men and cattle from whom she may suck her more nutritious, if less delicate, diet. The proboscis, whose double function of piercing and sucking was noticed even by Pliny, is an extremely complex structure composed of representatives of the three usual mouth appendages. The humming sound produced by the female in flying, the deeper notes of which are due to the rapid vibration of the wings (computed at 3,000 per minute), the higher to membranes on the thoracic openings of the air tubes, serves in part, doubtless, to attract the males. Several generations of gnats follow one another in a season. Gnats occasionally swarm together in such numbers that they present the appearance of dense clouds of smoke.

To strain at (an old misprint for out) a gnat and swallow a camel (Matt. xxiii: 24, Authorized Version). To strain out the gnat and swallow the camel. (Revised Version): Alluding to the care with which the Jews strained small insects out of the liquor they were about to drink. To be punctilious about trifles, and with the grossest inconsistency to allow one's self violations of moral principle in matters of great moment.

Gnathodon (nath′ō-don), a genus of birds, called also DIDUNCULUS (*q. v.*). In zoölogy and palæontology, a genus of conchiferous mollusks, family *Mactridæ*. It is so called because one of the lateral teeth connected with the hinge has a certain resemblance to a jaw-bone. Recent species, one certain and three doubtful; fossil three, from the Chalk onward. The best-known recent species is *G. cuneatus*, which was formerly eaten by the Indians. It is found with *Cyrena carolinensis* at Mobile, on the Gulf of Mexico, which is built on a shell bank consisting chiefly of the two species.

Gnedich, Nicolai Ivanovich (gnā′-dich), a Russian poet; born in Pultowa, Feb. 2, 1784. He studied classical philology and made himself the most accomplished Russian scholar of his day. A translation of Schiller's "Conspiracy of Fiesco" was an early effort; but his masterpiece is the translation of the "Iliad" into Russian (1829), not unworthy of the original, at which he worked for 20 years. A translation of Shakespeare's "King Lear," of Voltaire's "Tancred," and of notable modern Greek poems, occupied his later years. His own poem, "The Fishers,"

is much admired. He died in St. Petersburg, Feb. 15, 1833.

Gneisenau (gnī′ze-nou), **August Wilhelm Anton, Graf Neithardt von**, a Prussian general; born in Schildau, Prussian Saxony, Oct. 27, 1760. In 1782 he accompanied the German auxiliaries of England to the American colonies. On his return he joined (1786) the Prussian army, and 20 years later fought at Saalfeld and in the battle of Jena. He gave convincing proof of his military genius in the defense of Colberg from April to July, 1807; and this led to his appointment on the commission for the reorganization of the Prussian army. In the war of liberation he rendered distinguished service at the battle of Leipsic (1813). But his most meritorious work was his share in the Waterloo campaign, in which he was chief of Blücher's staff, and principally directed the strategy of the Prussian army. He had been 15 years on the retired list when, in 1831, on the outbreak of the Polish rebellion, he was made field-marshal and given command of the Prussian army on the Polish frontier. He died in Posen, Aug. 24, 1831.

Gneiss (nīs), a metamorphic rock, consisting of orthoclase, quartz, and mica. It is akin to mica schist, which, however, is distinguished by having less orthoclase and more mica. It has exactly the same materials as granite, but is stratified or foliated. Sometimes hand specimens are found, in which lamination is so little traceable that they might pass for granite. There are cases also in which gneiss, in position, does not consist of thin laminæ, but is divided into thick beds, in which the mica has only a slight degree of parallelism to the planes of stratification. Sometimes it is penetrated from below by granitic veins. Also a formation in which gneiss prevails, but not exclusively, there being present also hornblende-schist and other metamorphic rocks. These latter are considered as subordinate to the gneiss. Fundamental gneiss, Laurentian gneiss, the name given by Sir Roderick Murchison to the oldest stratified rock in Scotland. It is found in the N. W. of Ross-shire and in Sutherlandshire, besides forming the whole of the adjoining island of Lewis in the Hebrides. It has a strike from N. W. to S. E., nearly at right angles to the metamorphic strata of the Grampians. The Lower Cambrian and various metamorphic rocks rest on it unconformably.

Gneist, Heinrich Rudolf Hermann Friedrich von (nīst), a German jurist; born in Berlin, Aug. 13, 1816. He entered official life as assessor in the Superior Court (*Kammergericht*) in 1841, and was successively assistant-judge of the same court and of the supreme tribunal, till in 1850 he resigned this position in order to devote himself exclusively to teaching; for since 1844 he had held the chair of jurisprudence in Berlin University. From 1858 he sat in the Prussian Lower House as a National Liberal, and was also elected a member of the Imperial Parliament. He wrote: "Organization of the German Jury" (1849); "Nobility and Knighthood in England" (1853); "Present English Constitutional and Administrative Law" (3d edition, 1876–1884), his masterpiece; "Government of the City of London" (1867); "History of the English System of Government" (1882); "The English Parliament" (1886); etc. He was ennobled in 1888, and died July 21, 1895.

Gnesen (gnā′zen) (Polish Gniezno), a Prussian town, in a region of hills and lakes, 31 miles E. N. E. of Posen. It has a Catholic cathedral, dating from 965, and till 1320 was the coronation place of the Polish kings. It passed to Prussia in 1814.

Gnetaceæ (nē-tā′se-ē), in botany, joint-firs; an order of gymnogens, with repeatedly-branched jointed stems and simple net-veined leaves, opposite and entire, sometimes very minute and scale-shaped; flowers in catkins, or heads; the males with a one-leaved calyx, transversely slit at the end; a monadelphous filament, with one-celled anthers opening by pores; females, altogether naked or sheltered by a false calyx, consisting of two scales, each surrounding two flowers; ovary, none; ovule with a style-like process. Known genera, two — viz., GNETUM and EPHEDRA (*q. v.*); species, 15, scattered over the world.

Gnetum (nē′-) (Corrupted from gnemon, the name given to the plant in the island of Ternate), in botany, the typical genus of the order GNETACEÆ (*q. v.*). The species are found in the hottest parts of India and Guiana. In Amboyna the seeds of *G. gnemon* are eaten boiled, roasted, or fried, and the green leaves, though tasteless, are used as spinach.

Gnidus. See CNIDUS.

Gnome (nōm), in mediæval mythology, the name given by cabalistic writers to one of the classes of imaginary beings which are supposed to be the presiding spirits in the mysterious operations of nature in the mineral and vegetable world. They have their dwelling within the earth, where they preside specially over its treasures, and are of both sexes, male and female. The former are often represented in the form of misshapen dwarfs, of whom the well-known "Rübezahl," or "Number-nip," of German legend is a familiar example. Pope, in the "Rape of the Lock," and Darwin, in the "Loves of the Plants," have drawn on the

more pleasing associations of this curious branch of mythology. Also a small and ill-favored person; a dwarf; a person of outlandish appearance; a misshapen being.

Gnome, a short, pithy saying, often expressed in figurative language, containing a reflection, a practical observation, or a moral maxim. Among the Greeks Theognis, Phocylides, and others are called the gnomic poets, from their sententious manner of writing.

Gnomon (nō′mon), in astronomy, a rod, style, or pillar erected perpendicularly to the horizon, from whose shadow the altitudes, declinations, etc., of the sun and stars may be determined. Such styles were in use in ancient Egypt, in China, and similar contrivances were found at Quito by the invading Spaniards. Also the style or pin, which, by its shadow on the dial plate of a sun dial, shows the hour of the day. In geometry, the figure made up of the two complements of a parallelogram, together with either of the parallelograms about the diameter. Also the index of the hour-circle of a globe.

Gnomonic Projection, the projection of the lines of a sphere on a plane tangent to the surface of the sphere, the point of sight or the eye being taken at the center of the sphere. In this projection all great circles of the sphere are projected into straight lines; all small circles, whose planes are parallel to the plane of projection, into concentric circles, having their common center at the point of contact; and all other small circles into ellipses. Gnomonic projection is also called horologiographic projection, on account of its use in dialing.

Gnosticism (nos′-), a system of philosophy professedly Christian, devised to solve the great questions, such as the origin of evil, which have perplexed the ablest minds in every age. Gnosticism accepted beliefs in an eternal God of infinite power, wisdom, and goodness. The granting of this postulate at once brought the gnostic face to face with the question, Why then did this Great Being allow evil to arise in the universe, when it was in His power to have prevented it? If He did not prevent it, was He not to a certain extent responsible for its existence? The same difficulty had centuries before created the dualist system of Zoroastrianism, which, denying the omnipotence of the one Supreme Being, assumed the existence of two, a good and a bad one, about equal in power, and in continual conflict. This view, derived from Persia, was partially adopted by some gnostics, while others of the sect, or aggregation of sects, drew on the later Platonism of Alexandria for their inspiration. There were then two classes of them: the Syrian, and the Alexandrian, or Egyptian gnostics. In certain tenets both agreed. Matter was eternal, and from the first essentially evil; there was then no bygone time when the "origin of evil" took place. Nor was the world created by the Supreme Being; it was framed by an exalted spirit, called in consequence the DEMIURGE (*q. v.*), whom many identified with the God of the Jews. He had shining qualities, but was selfish and arrogant. He wished men to worship, not the Supreme Being, but himself. The former was the purest Light, and pervaded that boundless space which the Greeks called pleroma. He did not remain forever alone, but brought into existence two holy and happy spirits of different sexes, called Æons, from whose marriage came others of the same order, till there was a whole family of them in the pleroma. The chief of these Æons was Jesus Christ, who was sent to the world to win it back from the Demiurge to its proper allegiance. Many gnostics held what were called Docetic views. The germs of gnosticism existed in the 1st century; it did not, however, reach maturity till the reign of Adrian in the 2d. Of the Syrian gnostics there were Saturninus of Antioch, Cerdo, Marcian, Lucian, Severus, Blastes, Bardesanes, Tatian, etc.; of the Egyptian Basilides of Alexandria, Valentinus, etc. The system had a good deal declined by the 3d century, but was not extinct till about the 6th. It has been disputed whether there are allusions to either nascent or fully developed gnosticism in the New Testament. Some writers profess to find them in such passages as Col. ii: 8; I Tim. i: 4, vi: 20; II Tim. ii: 16, 17; Titus iii: 9; and there appears to be one to Doceticism in I John i: 1-3.

Gnu (nö), in zoölogy, *Catoblepas gnu*, a species of antelope. The adult male is about 5 feet 6 inches long, and 3 feet 10 inches high at the shoulder; horns, dark, broad, upon the summit of the head, tapering out sideways over the eyes, and turning up into a pointed hook. Legs long. The face is covered with black, bristly hair, with white ones around the eye and on the legs; on the neck is a vertical mane, black in the center and white at the sides; a bushy beard on the under jaw; general color of the fur deep brown, with long white hair on the tail. Female smaller; calves pure white. But for the horns and the cloven hoofs the gnu would resemble a horse in its external form; its gallop also is that of a horse. The gnu lives in small herds in the karroos of Southern Africa. When alarmed it flings up its heels and capers like a restive horse; then the herd goes off in single file, following a leader, with amazing speed. A gnu brought to bay or wounded turns on its assailant. It is be-

lieved that the kokoon is not distinct from the gnu.

Goa (gō′ä), a maritime city of India, chief city of the district of the same name, and formerly capital of all the Portuguese settlements in India, on an island of the same name, at the mouth of the Mandona, 250 miles S. S. E. of Bombay. Goa consists of Old Goa and New Goa. The old city, now almost deserted, contains some splendid churches and other specimens of architecture. New Goa, or Panjin, at the mouth of the river within the forts, is the residence of the viceroy and of the principal inhabitants. It carries on trade with Portugal, China, and the coast of Africa. Pop. (1900), district, 475,000.

Goa, an antelope found in the vicinity of Tibet.

Goadloup, the gantelope, or gantlet, a military punishment, in which the criminal, running between the ranks, receives a lash from each man. See GANTLET.

Goaf, in mining, the waste place in a colliery; the refuse that is left behind when the work is completed; the space from which the coal has been removed, and in which the roof has been permitted to fall in; also called gob.

Goal, the winning post in a race; the point or mark set to bound a race. In FOOTBALL (*q. v.*), the space marked by goal posts and a cross bar to define the required path of the ball in order that a "goal" may be scored. According to Rugby rules, the ball must be kicked over the cross bar; according to association rules, it must go under. Also the act of kicking the ball through or over the goal posts.

Goalanda (gō-a-län′dä), a market-town of Bengal, on a tongue of land at the confluence of the main streams of the Ganges and Brahmaputra, an important entrepôt for the river trade, the terminus of the Eastern Bengal Railway, and the starting point of the Assam steamers. Busy markets are held daily, and the river is crowded with native craft, in which most of the trade is carried on, and fishing boats.

Goa Powder, a powder deriving its name from the island of Goa, on the Malabar coast; it is very bitter and is the material from which chrysarobin is obtained.

Goar, St. See ST. GOAR.

Goat, *Capra hircus*, the domestic goat, which exists, in a wild or semi-wild state, in all the European mountain ranges. It is generally supposed that it may be a descendant of the paseng of Persia (*C. ægagrus*). Prof. Boyd Dawkins considers that it with various other domestic animals, came in with the neolithic farmer and herdsman, there being no trace of it while the palæolithic hunter constituted the highest type of manhood in Europe. The males fight furiously with each other in the rutting time. They have an offensive smell. A most important variety, formed into a breed by artificial selection, is the Angora goat, where almost the whole body is enveloped in that long, silky, white hair which is so familiarly valuable and comfortable. The Angora goat has been introduced into Cape Colony, Australia, and the United States. The Kashmir goat, from Tibet and Bokhara, is almost equally valuable, furnishing the white to brown hair used in making Kashmir wares. It has been successfully acclimatized in France. A third variety, utilized in the same way, is the Mamber goat from Asia Minor and Tartary, distinguished by its long pendent ears. The Syrian goat, which also has long ears, is trained in the East to all manner of tricks — especially to balance itself on a slender pile of small wooden blocks, built

BIG HORN GOAT.

up to a height of several feet. The Alpine ibex is a magnificent goat, without beard, but with very strong, slightly divergent, much-ridged horns. It used to be abundant, but through over-hunting, both for sport's sake and on account of supposed medicinal virtues, has become nearly extinct. In its native haunts it is said "to surpass even the chamois in the certainty with which it estimates distances for extraordinary leaps."

The goat is capable of the most perfect domestication, and becomes extremely attached and familiar. It is apt, indeed, to prove a troublesome pet, and makes use of its horns, though not angrily, much more freely than is at all agreeable. The uses of the goat are numerous. The flesh is good; that of the kid, or young goat, is in most countries esteemed a delicacy. Requiring but little attention, and able to

subsist on rough diet, the goat is in many countries "the cow of the poor." The milk is very rich and nutritious, more easy of digestion than that of the cow, and often useful to consumptive patients. Some goats yield as much as four quarts of milk daily, though the average quantity is more nearly two. Both cheese and butter are made of goats' milk; they have a peculiar but not disagreeable flavor. Goats' milk is still very much used in Syria and other parts of the East, as it was in the days of the patriarchs. The skin of the goat was early used for clothing, and is now dressed as leather for many uses, particularly for making gloves and the finer kinds of shoes (see GLOVES). The hair, which may be advantageously clipped annually, is used for making ropes which are indestructible in water, and for making wigs for judges, barristers, and other functionaries. For the latter purpose the hair of white goats is used. Especially valuable of course are the Angora and Kashmir varieties. The horns are used for making knife handles, etc., and the fat is said to be superior to that of the ox for candles. Goats are sometimes employed in drawing children's coaches. The goat ruins young plantations, and makes reforesting in some cases impossible. The Rocky Mountain goat is an antelope rather than a goat. See ANGORA GOAT.

In Christian art the goat is an emblem of impurity. It sometimes occurs in the carving under seat or choir-stalls, and is put there as a mark of dishonor.

Goatfish, *Balistes capriscus,* a fish of a brownish-gray color, spotted with blue, or greenish. Its flesh is little esteemed. Its appropriate habitat is the Mediterranean, but it has been found in other seas. It is called by Yarrell the European filefish.

Goat Moth, *Cossus ligniperda,* a large moth belonging to the family *Zenzeridæ.* The fore wings are pale brown, clouded with whitish, and marked with numerous short, irregular transverse wavy black lines; hind wings pale-smoky, with similar transverse dark lines, but less distinct; expansion of wings, 3 to above 3½ inches; larva reddish black on the back, sides of a dull yellowish or flesh color; head black; smell offensive. It feeds on the wood of willows, poplars, and oaks, sometimes perforating the wood in all directions. It is said to be three years in reaching maturity.

Goat Stone, a stone called capra, said to be found in the bodies of some Indian goats, and once supposed to be a cure for the disease of the stone.

Goatsucker, one of the English names of a remarkable migratory bird, *Caprimulgus europæus.* The erroneous belief that it sucks goats seems to have arisen among the goatherds in ancient Greece, who called it aigotheles, from *aix* (genit. *aigos*)=a goat, and *thele*=the nipple; and the Romans, falling into the same error, denominated it caprimulgus.

Gobbe, or **Voandzou** (*Voandzeia subterranea*), a leguminous annual of tropical Africa, sub-order *Cæsalpineæ,* of which the

GOAT MOTH.

young pod is thrust into the ground in the same manner as that of *Arachis hypogæa* (the ground bean), thus at once protecting and planting the seeds. The rich, oily seeds (Angola peas) are wholesome and agreeable when boiled. The young pods also are used like French beans.

Gobelin (gob-lan'), a family of French tapestry-makers and dyers who became famous for the exquisite tapestries they manufactured. They were descended from Jean Gobelin, who founded the establishment in Paris and died in 1476. About 1667 the manufactory was turned into a royal establishment under Louis XIV. The factory still produces the finest tapestry in the world.

Gobi (gō'bē), **Desert of,** the Shamo, or "sand-sea" of the Chinese, an immense tract of desert country, occupying nearly the center of the high tableland of Eastern Asia, between lat. 35° and 45° N., and lon. 90° and 110° E., and extending over a large portion of Mongolia and Chinese Turkestan. Its length is probably about 1,800 miles; mean breadth, between 350 and 400 miles; area, 300,000 square miles. Its general elevation is over 4,000 feet above sea-level. The East Gobi is occupied by different tribes of the Mongolian race, who have numerous herds of camels, horses, and sheep. In the West Gobi are some no-

madic tribes of the Tartar race. This tract is supposed at one time to have been a great inland sea.

Gobiidæ (gō′bi-i-dē), or **Gobioidæ** (-oi′-dē), in ichthyology, gobies, a family of *Acanthopteri veri*. The edges of the operculum are unarmed, and its aperture small; the ventral fins, whether united or separated, constitute a funnel, and are situated on the breast; the pectoral ones are large, all the rays of the dorsal and anal fins soft and flexible; the skin is either naked or armed with large finely ctenoid scales. Most of them are small fishes, found among rocks or in tidal rivers. They sometimes attach themselves by their suckers to the underside of stones.

Gobineau (go-bē-nō′), **Joseph Arthur, Comte de,** a French diplomatist, ethnologist, and romance-writer; born in Bordeaux, France, in 1816. During a long diplomatic career he held important positions at Athens, Copenhagen, and Rio Janeiro; was a member of the embassy to Persia, 1855; and Imperial Commissary to the United States, 1861. During his long stay in the East he studied Oriental religions, and brought out his famous work "Religions and Philosophies in Central Asia" (1865). Among other publications are: "On the Inequality of Human Races" (1853–1855), which has been the point of departure for a new ethnological school; "History of the Persians" (1869). In fiction: "Typhaine Abbey" (1867); "Souvenirs of Travels" (1872); "Asiatic Tales" (1876), a masterpiece of pure literature and imaginative realization of character. "Amadis," a poem in three books (unfinished), was published posthumously in 1887. He died in Paris, Oct. 17, 1882.

Gobonated, in heraldry, an epithet applied to a border, pale, bend, or other charge divided into equal parts forming squares, gobbets, or checkers. Called also gobonė, or gobony.

Göckingk, Leopold Friedrich Günther von (gek′ingk), a German poet; born in Gröningen, Halberstadt, July 13, 1748. His prime was passed in official employment, and in 1789 he was ennobled. He retired some years later, and devoted himself seriously to literature. His principal works are: "Epigrams" (1772), some of which are admirable; "Songs of Two Lovers" (1777), greatly admired by his contemporaries, who read between the lines the story of the writer's life; three volumes of "Poems" (1779); "Charades and Riddles" (1817); "Life and Literary Remains of Nicolai" (1800). He died in Wartenburg, Silesia, Feb. 18, 1828.

God. All theologians and philosophers are agreed that we can have no adequate knowledge or conception of God; still three methods are given by which we can arrive at some idea of the Supreme Being. These are, first, by negation, that is, by abstracting from our idea all imperfection; secondly, by eminence, that is, by including in it every excellence in an infinite degree, which we find in created beings in a finite measure; and thirdly, by causality, that is, by including in it the attribution of power sufficient for the creation and maintenance of every other existence. The enumeration of these three methods is due to a philosopher of the Neo-Platonic school, called Dionysius the Areopagite. It is evident, however, that these three methods are not really distinct, for the first implies the other two. A being who is free from every imperfection must necessarily be endowed in an infinite degree with every conceivable excellence, for the want or limitation of any excellence would be an imperfection; and as power is an excellence, the possession of infinite power is implied in the possession of every excellence in an infinite degree.

Such an idea of God, inadequate though it be, is the highest to which the human intellect can attain; but for that very reason it is not the conception of the Deity which has prevailed at all times and in all places. It is necessary that the mind of man be elevated to a certain standard before it can even approach this idea, and hence we find that uncivilized and uncultivated peoples have at all times believed in deities who are deformed by human imperfections and whose powers are limited either by inanimate forces or by other deities like themselves. In this article we will confine ourselves to the idea of God in its highest form and merely give a short summary of the different methods that have been adopted for proving the real existence of a being corresponding to this idea, as well as of the refutations that have been advanced in reply to them; for various and numerous as are the means by which different persons have professed to be able to demonstrate the existence of God, there is not one of them which others have not professed to be able to refute.

The arguments for the existence of God have been divided by Kant into three classes — the ontological, the cosmological, and the physico-teleological; and his division has been very commonly followed by subsequent thinkers. Each of these arguments Kant states and refutes in his "Kritik of Pure Reason." The ontological argument starts from the idea of God itself and professes to demonstrate the existence of God as a necessary consequence from that idea. This form of argument is, in some shape or other, a very old one, but was first fully developed and applied by Anselm in the 11th century. The manner in which it was stated by Anselm is this: "God must be

God

thought of as that being than whom none can be thought greater; but this being the highest and most perfect that we can conceive may be thought as existing in actuality as well as in thought — that is to say, may be thought as something still greater; therefore God, or what is thought as greatest, must exist not only in thought but in fact." This argument is one of the most celebrated which have ever been brought forward, and has been the subject of much discussion. It was first advanced by Anselm in his "Proslogium," but soon after its appearance a work appeared in refutation of it by Gaunilon, a monk of Marmoutiers, and its refutation has since been taken in hand by Descartes, Kant, and many other thinkers. The replies offered to it are various. First, it is denied that the conception of an object as actually existing is a higher or more perfect conception than that of the same object as existing only in thought. Existence adds nothing to the conception which is in every respect the same whether it be conceived as existing in the intellect alone or as also existing in actuality. But it is further urged that even if this be granted the argument is logically invalid, and the conclusion ought to be, not that the highest object of thought does also exist in fact, but that it must be thought as existing in fact. And if to this the answer be returned that it is not the conceived existence of the given object of thought which is said to be greater than the object merely as an object of thought, but the real existence affirmed to be greater than the conceived existence, it is again replied that in that case the first object of thought still remains the greatest that can be conceived, that with which it is compared being a real existence, not an object of thought at all, and accordingly not conceived; in which case the inference drawn is wholly unwarranted, since the possibility of any higher conception than that first stated has not been demonstrated. The confusion lies in speaking of real existence as opposed to existence in thought, seeing that we cannot speak with any meaning of any object as really existing except it is thought to be so; but it is quite legitimate to employ a merely verbal refutation against a merely verbal argument. A precisely similar argument might be used to show the non-existence of the devil, if we only define the devil as that than which nothing can be thought meaner; for whatever idea we may form of him to answer to this condition, yet we may always conceive the object of our thought as non-existent in reality, which is meaner still, and therefore the devil, although he may exist in thought, cannot exist in reality.

Descartes, while refuting Anselm's form of the ontological argument, revived it himself in another form. Applying the test of truth which he derived from his celebrated formula, "I think, therefore I am," that whatever we clearly and distinctly perceive to belong to the true and unalterable nature of a thing may be predicated of it, he found on investigating God that existence belongs to his true and unalterable nature, and therefore may legitimately be predicated of him. He illustrates this by the case of a triangle, of which we are warranted in asserting that it must have three angles, because we clearly and distinctly perceive that property to belong to the true and unalterable nature of a triangle. In refuting this argument Kant enforces the distinction between analytic and synthetic propositions, the former being those in which the predicate asserts of the subject something that is already contained in the idea of the subject, as when we say that a triangle has three angles; and the latter, those in which the predicate asserts something of the subject which is not contained in its idea, as when we affirm the existence of anything, as a table. He then asks whether the proposition that God exists is an analytic or synthetic proposition. If it is analytic, he says that in that case we add nothing to the idea that we have of God already; the proposition is merely an affirmation of what is already known and can only be true in this sense of a God that is already given as existing. If, on the other hand, the proposition, "God exists," is a synthetic one, then it cannot be derived from the idea itself and the affirmation of it is a mere assumption of the very thing that has to be proved. "All the pains and trouble," he concludes, "of this argument are lost, and a man will no more increase his knowledge by mere ideas than a merchant will increase his means by the addition of a few ciphers to his balance." A similar argument to this of Descartes was advanced by Leibnitz, which is involved by Kant in the same condemnation.

Another argument was adduced by Descartes to prove the existence of God, which, although not the same with the ontological argument, appears to resemble it. It is called the psychological argument. Like the ontological argument, it starts from the idea of a supreme and perfect being, but it does not assert the objective existence of that being as implied in its idea, but infers such objective existence on the ground that we could have acquired the idea only from the being which corresponds to it. This argument is replied to by Gassendi and others, who deny that we have a clear idea of a supreme and perfect being, or any idea but such as corresponds with the imperfection of our own faculties and can therefore be readily explained as having arisen from our own nature and circumstances.

After dealing with the ontological argument Kant passes on to the cosmological ar-

God

gument, which starts not from an idea, but from a contingent existence, and infers from it an absolutely necessary being as its cause. To this argument Kant has two objections. First, in accordance with the spirit of his "Kritik of Pure Reason," he denies the right to infer from a phenomenal and contingent existence a necessary existence beyond the reach of experience. He denies to the law of causality any validity beyond the phenomenal world, and refuses to admit that the principles of reason authorize us in breaking the chain of phenomenal causes in order to attach it to a necessary being beyond the world of sense. But, secondly, he says that if this inference be allowed we have still reached no God; we know nothing of the attributes of this necessary being, and we can only seek in pure idea the attributes with which to clothe it, that is to say, the cosmological argument brings us back to the ontological one and with it must fall.

The argument called the physico-teleological is that which is commonly known as the argument from design, which has been so fully illustrated by Paley in his "Natural Theology" (a work based on a similar one written by a Dutchman, called Bernard Nieuwentyt). The argument is capable of receiving literally endless illustrations, but may nevertheless be stated in a few words. It is simply this, that in nature there are unmistakable evidences of the adaptation of means to ends, which lead us inevitably to the idea of one that planned this adaptation, of God. The eye, for example, is evidently so constructed as to enable us to see, therefore there must have been some one who designed the eye, and that designer is God. This argument, which is recognized by nearly all thinkers as the most convincing and perhaps the best, is yet subjected by Kant to the same criticism as the other two. At best, he says, the legitimate inference is only that there is a world designer, a builder who gave form to materials already presented to his hand, and if we press the argument any further to prove the existence of a supreme and all-perfect being we find ourselves landed in the cosmological argument, which again lands us, as we have seen, in the ontological argument. This criticism of Kant's is accepted even by many Christian theists, who think that nothing but injury is done to the argument by attempting to prove by it more than it can be legitimately held to do, and therefore appeal to this argument merely to prove the existence of a designer, relying for a knowledge of his attributes upon what he has been pleased to reveal with regard to himself.

But this argument has been criticized by others than Kant, who push their criticism to a greater length, by Hume for example, and the modern Positivists. Hume argues thus: When we see any work of man's art, we immediately infer that there must have been a designer from our uniform experience of the fact that such works always proceed from designing minds; but the universe, he says, is a singular effect, and we have no experience of how it is made so that no inference whatever is valid with reference to it. To this several answers have been made. Dugald Stewart replies, that although the universe, taken as a whole, is indeed a singular effect, yet it is not merely from looking at the universe in this way that the inference is made. We see evidences of a designer in the fact that many things are made to follow one another in succession which all conduce to the same end, and similarly many simultaneous events or conditions are so arranged as to bring about a certain result. But this objection does not evade Hume's mode of argument, for as Hume holds that the only thing that legitimates the inference that human works of art have proceeded from a designing mind is our uniform experience that they do thus proceed, these instances appealed to by Dugald Stewart are all merely different examples of one singular or peculiar case with regard to which we have no experience. Others refute Hume's argument by denying that it is in virtue of experience that we infer from the evidence of design in a particular work the existence of a designer, averring on the contrary that we make the inference by an original necessity of our nature and as certainly the first time that we see evidences of design as after repeated experiences of it. If this be asserted only with regard to human works of art and human designers, the alleged necessity does not make a like inference necessary from design or adaptation of means to ends in nature to a designer of nature; and if it be asserted with regard to all design, then Hume would seem to have been in a position to deny the reality of the alleged necessity, otherwise he could not have questioned the validity of the argument upon which he attempts to throw doubts. The Positivists reply to the argument from design by asserting that whenever we pretend to discover design in the works of nature we go beyond the province of the human mind; that all that the mind can do toward nature is to observe its sequences and co-existences, and that it cannot perceive design in the phenomena which it observes, but that design is something added to the phenomena; that we ought not to say that the eye is made for seeing, but that we see because the structure of the eye is such as makes it possible for us to see. The works of nature may, they admit, be the result of design, but whether they are so or not is a question which the human mind with its present means of knowledge is unable to determine, and we ought not

to pretend to see in phenomena what we in reality cannot see there.

All the arguments for the existence of God which appeal to the speculative reason may, in Kant's view, be referred to one or other of the heads which we have just treated, the ontological, cosmological, and physico-teleological, and they are all pronounced as the result of his criticism, unsatisfactory. In this strait Kant turns from speculative reason to practical reason, and bases on it an argument of his own. Practical reason, he says, imperatively demands that in our practice we should aim at the realization of the supreme good which is comprised in supreme virtue and supreme felicity. The conditions of nature, however, are opposed to the realization of either the one or the other. Yet practical reason demands that we endeavor to reach both. It must therefore be possible. What prevents us from attaining supreme felicity is that nature does not agree with our objects, and that as active beings we are not the causes of nature. We cannot, therefore, attain supreme felicity by our own wills, and in order that the demands of practical reason may be satisfied there must be some being superior to nature, the common cause both of the natural and the moral world, who can bring both into harmony and secure to us complete felicity in obeying the moral law. To this argument it has been objected that it has only a subjective force and cannot prove the objective reality of the being whom it supposes; and that in arguing from the fact of man feeling himself obliged to obey conflicting laws, the only valid inference is that there must be disorder somewhere, in which case it may be questioned whether the disorder be not in man himself and whether all would not be right if he were brought back into harmony with the universe.

Another argument has been adduced for the existence of God, derived from the fact that such a belief is everywhere found to be implanted in the breast of man. This argument is used among others by Cicero and many thinkers are inclined to give a great deal of weight to it; still it is pronounced by others to be at best only a probable argument, if it may be accepted as valid to prove anything at all. Others argue the existence of God from the manifestations which he has made of himself to men, but these, as well as miracles, it is admitted even by Christian theists can only be accepted as real by such as previously believed in the divine existence.

Godavari (gō-dä′va-rē), one of the principal rivers of India, and the largest of the Deccan, rises from the Western Ghats, within 50 miles of the Indian Ocean and crosses the Deccan in a S. E. course. After passing through the Eastern Ghats it separates into several arms and falls into the Bay of Bengal which it enters by seven mouths, after a course of 898 miles, its total drainage area being estimated at 112,000 square miles. It has been called the Indian Rhine. The navigation of the upper waters is impeded by three impassable rocky barriers or rapids within a space of 150 miles. The Godavari is one of the 12 sacred rivers of India, and the great bathing festival, called Pushkaram, is held on its banks once in 12 years; each of its seven mouths is esteemed holy, but especially the Gautami mouth, the larger of its two arms, which enters the sea not far from Cocanada.

Goddard, Arabella, an English pianist; born near St. Malo, Brittany, Jan. 12, 1836. She received lessons from Kalkbrenner, Thalberg, and Macfarren. She made her début at the Grand National Concerts in London in 1850, and in 1854–1856 performed with great success in the principal cities of France, Germany, and Italy. In 1860 she married Mr. Davison, a musical critic. She took her farewell of the British public in 1873, and then made a tour to Australia, the Sandwich Islands, and the United States, returning to England in 1876.

Goddard, Calvin Luther, an American inventor; born in Covington, N. J., Jan. 22, 1820; was graduated at Yale College in 1845. His inventions include a burring picker for cleansing wool, solid packing burring machines, feed rolls for use in carding machines, steel ring feed rolls with adjustable stands and spring boxes; etc.

Godefroy, Frédérick (god-frwä′), a French lexicographer; born in Paris, Feb. 13, 1826. He wrote "Comparative Lexicon of the Language of Corneille and of the Seventeenth Century in General," and "History of French Literature from the Sixteenth Century to Our Own Day," which gave him an international reputation. His monumental effort, however, is the voluminous "Dictionary of the Old French Languages and of All Its Dialects from the Ninth to the Fifteenth Century."

Godenda, a pole-ax having a spike at its end, used in the 13th century; so called because the Flemish soldiers virtually said the words of parting, "Good Day," to the enemy, when by using this weapon against them they compelled them to depart.

Goderich, a port of entry of Ontario, on Lake Huron, 160 miles W. N. W. of Buffalo by rail, with a good harbor protected by a pier, also several factories and mills, and eight salt wells.

Goderich, Viscount. See ROBINSON, F. J.

Godet, Philippe Ernest (gō-dā′), a Swiss author; born in Neuchâtel, April 23, 1850. He was bred to the law, but

abandoned it for journalism. He became instructor in literature in the Academy at Neuchâtel. As a poet he pleases, without stirring any profound depths, in such volumes as "A Handful of Rhymes," "First Poems," and "Realities." In prose he wrote: "The Literary History of French Switzerland," his greatest work, which won the French Academy's Guérin prize; "Studies and Talks"; and a biography of Pierre Viret.

Godfather and **Godmother** (also called sponsors), the persons who, by presenting a child for the sacrament of baptism, which is regarded as a new spiritual birth, are reputed to contract toward the newly baptized the relation of spiritual parentage. In the Roman Catholic Church this spiritual relationship is regarded as a species of kindred (whence the name gossip, or God-sib, "spiritually akin"), and constitutes an impediment of marriage between the sponsors on the one hand and the baptized and the parents of the baptized on the other. Anciently, this impediment arose also between the sponsors themselves; and it still extends much further in the Eastern than in the Western Church, though in the former it can arise only from baptism, whereas in the Roman Church the candidate for confirmation also is presented by a sponsor, though usually one of the same sex.

In the Anglican Church, by whose rule two godfathers and a godmother are required at the baptism of a male, and two godmothers and a godfather at that of a female, no impediment of marriage arises from the relation of the sponsors to the baptized. The parents of the baptized are not permitted to act as sponsors in the Roman Catholic Church, one of the objects of the institution being to provide instructors in case of the death of parents; but the present rule of the Church of England, following the rubric of the American Prayer Book, does so allow.

Godfrey, Sir Edmondbury, the English magistrate who received the depositions of Titus Oates with regard to the alleged popish plot, Sept. 28, 1678. He was soon after found dead, pierced with his own sword, though evidently not by his own hand. His death was imputed to the resentment of the Papists, and the excitement aroused was the actual cause of the Popish Plot agitation.

Godfrey of Bouillon (bö-yôn′), leader of the first crusade, son of Eustace II., Count of Boulogne; born near Nivelles, in 1061. He distinguished himself while fighting for the Emperor Henry IV. in Germany and Italy, and was made Duke of Bouillon. In order to expiate his sin of fighting against the Pope, he took the cross for the Holy Land in 1095, and led 80,000 men to the East by way of Constantinople. On May 1, 1097, they crossed the Bosporus, and began their march on Nice (Nicæa), which they took in June. In July the way to Syria was opened by the victory of Dorylæum (Eski Shehr), in Phrygia, and before the end of 1097 the crusaders encamped before Antioch. The town of Antioch fell into their hands in 1098, and in the following year Godfrey took Jerusalem itself, after five weeks' siege. The leaders of the army elected him king of the city and the territory; but Godfrey would not wear a crown in the place where Christ was crowned with thorns; and contented himself with the title of Duke and Guardian of the Holy Sepulcher. The defeat of the Egyptians at Ascalon placed him in possession of all the Holy Land, excepting two or three places. Godfrey now turned his attention to the organization of his newly-established government, and promulgated a code of feudal laws called the Assize of Jerusalem. Godfrey was a favorite subject of mediæval poetry, and is the central figure of Tasso's "Jerusalem Delivered." He died in Jerusalem, July 18, 1100.

Godfrey of Strassburg, a German poet, who flourished about 1200; born probably in Strassburg. At any rate, he lived there. Besides many lays, we are indebted to him for the great chivalric poem, "Tristan and Isolde," derived from the legends of the Round Table.

Godfrey, Thomas, an American poet; born in Philadelphia, Pa., Dec. 4, 1736. He wrote in 1759 "The Prince of Parthia," a tragedy, believed to be the first dramatic work written in the United States. In 1763 he published "The Court of Fancy; A Poem." His poems were collected in 1767 by his friend, Nathaniel Evans. He died near Wilmington, N. C., Aug. 3, 1763.

Godiva (gō-dī′vä), the wife of Leofric, Earl of Mercia and Lord of Coventry in the reign of Edward the Confessor. Tradition says that, in 1040, she rode on her palfrey naked through the town of Coventry on her husband's promise that if she would do so he would relieve the inhabitants of certain exactions which bore heavily on them. She had first proclaimed that no one should leave his house before noon, that all windows and other apertures in the houses should be closed, and that no one should even look out till noon was past. Only one person, "Peeping Tom," the story says, attempted to look out, and he was immediately struck blind. A yearly pageant, in which a young woman enacted the part of Godiva, was long kept

up at Coventry, and still occasionally takes place. Tennyson based one of his delightful poems on this incident.

Godkin, Edwin Lawrence, an American journalist and essayist; born in Moyne, Ireland, Oct. 2, 1831. He graduated from Queen's College, and came to the United States in early manhood. After 1865 he was prominent in journalism. In addition to a "History of Hungary," and editorial work on the New York "Nation" and "Evening Post," he produced miscellaneous essays, the most prominent of which appear in "The Problems of Modern Democracy" and "Reflections and Comments"; also "Unforeseen Tendencies of Democracy" (1898). He died May 20, 1902.

Godless Month, in comparative mythology, the 10th month of the Japanese year, so called because then the lesser divinities were considered to be absent from their temples, for the purpose of paying the annual homage due to the celestial Dairi.

Godmer, a British giant, son of Albion, slain by Canutus, one of the companions of Brute.

Gödöllö (ge'del-le), a market-town of Hungary, 15 miles N. E. of Pest, with a royal castle and park presented by the Hungarians in 1867 to their king, the Emperor of Austria-Hungary. Here, April 7, 1849, the Austrian forces were defeated by the Hungarians.

Godoy, Manuel de (gō-doi'), a Spanish statesman; born in Badajoz, Feb. 12, 1767. He went to Madrid at an early age; in 1787 entered the company of bodyguards; was called to the council of state; in 1792 succeeded Aranda as first minister, and immediately declared war on France. At the peace in 1795 he was made a grandee of Spain of the first class, and received the title of Prince of the Peace. Signing, in opposition to the general desire of the nation, the treaty of St. Ildefonso, an offensive and defensive alliance with France, in 1796, he found all parties and classes in the state his enemies; he reduced their number to some extent by exile, but was compelled to resign office in March, 1798. Soon reinstated, he married, from political motives, Donna Maria Thereza de Bourbon, though he was already secretly married to Donna Josefa Tudo. In 1800 he commanded an expedition against Portugal, at the close of which he received further title and rewards. He attached himself to Napoleon; the insurrection of Aranjuez, in March, 1808, prevented his escape as purposed with the royal family, and on the abdication of Charles he was imprisoned. He was present at Bayonne on the signature of the new abdication, and he accompanied the royal family to Marseilles and Rome. On his wife's death he avowed his marriage with Josefa Tudo; settled at Paris in 1835, and died there Oct. 7, 1851.

God's Acre, a burying-ground attached to a church or place of worship.

Gödsche, Hermann (ged'she), a German author; born in Trachenberg, Silesia, Feb. 12, 1815. At first in the postal service, he began writing in 1849, over the name of "Armin"; and rose to eminence in journalism. As a novelist, his "Nena Sahib," "Villafranca," and "Biarritz," written under the pseudonym of "Sir John Retcliffe," represented his talent. He died in Warmbrunn, Nov. 8, 1878.

God's Truce, in the Middle Ages, a means introduced by the Church to check in some measure the hostile spirit of the times, by establishing certain days or periods during which all private feuds were to cease. It seems to have taken its rise about latter part of the 10th or beginning of the 11th century. At first the Church forbade all feuds on those days of the week which were especially consecrated by the death and resurrection of Christ; namely, from Thursday evening to Monday morning, and threatened with excommunication any who transgressed that order. Afterward the period was extended so as to include the whole of Thursday, the whole of the period from the beginning of Advent to the Epiphany, and certain other times and saints' days. The precincts of churches, convents, and graveyards were also interdicted from any hostile encounters.

Godwin, Earl of the West Saxons. He was probably son of the South-Saxon Wulfnoth, who was outlawed in 1009, and regained his father's lands by his conduct in the contest with Canute. By 1018 he was an earl, and the year after he married the daughter of Ulf, and soon became Earl of the West Saxons. In 1042 he took the foremost part in raising Edward to the English throne, and was rewarded by the marriage of his daughter Edith to the English king — a union which, however, turned out unhappily. Godwin led the struggle against the worthless king's fondness for foreign favorites, and thus drew on himself the violent enmity of the court party. The king heaped insults on Queen Edith, seized her dower, her jewels, and her money, and, allowing her only the attendance of one maiden, closely confined her in the monastery of Wherwell. Godwin and his sons were banished, but they contrived to keep alive the antipathy of the English to the Norman favorites of Edward, and in the summer of 1052 landed on the S. coast of England. The royal troops, the navy, and vast numbers of the burghers and peasants went over to Godwin; and finally the king was forced to grant his demands, and re-

place his family in all their offices. Godwin died April 14, 1053.

Godwin, Francis, an English clergyman; born in Hannington, Northamptonshire, England, in 1562, son of the Bishop of Bath and Wells; he was graduated at Christ Church, Oxford, in 1580; took orders; and was in succession rector of Sampford and vicar of Weston-Zoyland, both in Somersetshire. He was made in 1601 Bishop of Llandaff for his "Catalogue of the Bishops of England," and was translated to Hereford in 1617. His name is now remembered, not for his "Annals of England" (1616), but for his fanciful story, "The Man in the Moon, or a Discourse of a Voyage Thither, by Domingo Gonsales." He died in 1633.

Godwin, Mary, also known by her maiden name of MARY WOLLSTONECRAFT, an English author; born in London April 27, 1759. Her early training was very defective, but fitting herself for a teacher, she set up a school in conjunction with her sister at Islington in 1783. In 1786 she published "Thoughts on the Education of Daughters." This was followed by an answer to Burke's "Reflections on the French Revolution," the "Vindication of the Rights of Woman," etc. She had peculiar ideas on marriage, and formed a somewhat loose connection with an American of the name of Imlay, whose desertion caused her to attempt suicide. Some time after she fixed her affection on William Godwin. As the bonds of wedlock were deemed a species of slavery in her theory, it was only to legitimize the forthcoming fruits of the union that a marriage between the parties took place. She died in giving birth to a daughter, who afterward became the wife of Shelley the poet. Among her other works are a "Moral and Historical View of the French Revolution," and "Letters from Sweden, Norway, and Denmark." She died in London Sept. 10, 1797. See GODWIN, WILLIAM.

Godwin, Parke, an American journalist and author; born in Paterson, N. J., Feb. 25, 1816; was graduated at Princeton College in 1834; studied law and was admitted to practise, but preferred literary pursuits. He married a daughter of William Cullen Bryant, and from 1837 was for many years connected with the New York "Evening Post." During the administration of President Polk he was deputy collector of New York. He edited in 1843–1844 "The Pathfinder," and was for some years a contributor to the "Democratic Review." Of "Putnam's Magazine" he was for a considerable time the principal editor, and always a contributor. He published "A Popular View of the Doctrines of Fourier" (1844); Goethe's "Autobiography"; translated and edited Zschokke's "Tales"; "Undine"; "Sintram and his Companions"; "Handbook of Universal Biography" (1851); new edition entitled "Cyclopædia of Biography" (1878); "Constructive Democracy"; "History of France" (1860); "Out of the Past" (1879); "Biography of William Cullen Bryant" (1883); "New Study of the Sonnets of Shakespeare" (1900); etc. He died Jan. 7, 1904.

Godwin, William, an English political writer and novelist; born in Wisbeach, England, March 3, 1756. His father (1723–1772) was a dissenting minister. William was educated at Hoxton Presbyterian College; preached as a dissenting minister, 1777–1782, when his religious faith became shaken, he turned radical, and devoted himself to literature. He married Mary Wollstonecraft in 1798, though he had objections on principle to marriage. He wrote "Inquiry Concerning Political Justice, etc." (1793); "History of the Commonwealth" (1824–1828); the novels, "Caleb Williams" (1794); "St. Leon" (1799) "Mandeville" (1817); etc. He also published histories of Rome, Greece, and England, a "Pantheon," and "Fables" under the pseudonym of Edward Baldwin. He died in London April 7, 1836. See GODWIN, MARY.

Godwinia, named, in 1869, after George Godwin, an architect; in botany, a genus of arads, with 12 stamens. *G. gigas* is 10 feet high, two of which are occupied by the oblong, purple hood-like spathe. It is from Nicaragua, and is the largest arad known.

Godwit, a wading bird, *Limosa melanura,* and the genus *Limosa* generally. They undergo a double moult, having red plumage when young, and then, after moulting, black with a base of white; on the wings also is a white spot. The female is larger than the male. The godwit occurs in Europe, also in Africa and India. Its nest is of dry grass; the eggs four, light olive brown blotches, and spotted with darker brown.

Goemot (gō-ē′mot), or **Goemagot** (-em′a-got), the giant, who dominated over the W. horn of England, slain by Corineus, one of the companions of Brute.

Goethe, Johann Wolfgang von (ge′-te), a German poet, dramatist, and prose writer; born in Frankfort-on-the-Main, Prussia, Aug. 28, 1749. His father was a counsellor of State. Goethe has described his own life in which, with a master hand, he unfolds the secret springs of the human character and gives us the key to the most important periods of his life and consequently to the productions by which they were respectively distinguished. Goethe's father was an admirer of the fine arts and was surrounded by pictures, which early developed in the son the nice discrimination and the active observation for which he was so remarkable. The Seven Years' War broke out when

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Goethe was eight years old, and Count de Thorane, lieutenant du roi of the French army in Germany, was quartered in the house of his father. The count, who was a man of taste, soon gave employment to the artists of Frankfort. Young Goethe was often present at the conversations of the count with the artists respecting the plans of pictures, the way of executing them, etc. These conversations had a great influence on the mind of the young poet. The count was fond of him and allowed him to take part freely in the conversations; and some pictures relating to the story of Joseph were actually painted from his suggestions. At the same time he learned the French language practically; and a French company, then performing at Frankfort, awakened his taste for dramatic performances. Drawing, music, natural science, the elements of jurisprudence, and the languages, occupied him alternately. To assist his progress in the languages he formed the plan of a novel, in which seven brothers and sisters correspond with each in different languages. The youngest of these fictitious persons used Jewish-German, which led Goethe to study a little Hebrew, in which he never indeed became a great adept, but which, nevertheless, had an influence on him in his childhood and may have had a tendency to encourage his inclination to Oriental poetry in his later years. By his study of Hebrew Goethe became more intimately acquainted with the Old Testament, and the "History of Joseph" was his first poetical work. His love for spectacles attracted his attention to a puppet show, and in the beginning of his "Wilhelm Meister" he undoubtedly took from his own life the motives of Meister's love for this kind of exhibitions.

Goethe very early fell in love, and as often happens in the case of boys of an ardent temperament with a girl older than himself. Her name was Margaret, the name which Goethe afterward gave to the mistress of Faust. Though he was then a mere boy his passion was so violent as to deprive him of sleep and appetite so that he fell seriously sick. With returning health he acquired a firmer character and applied himself with more zeal to his preparation for the university. In 1765 he went by his father's desire to Leipsic, where Gottsched still lived; but Ernesti and Gellert chiefly attracted his attention. The young poet did not follow any regular course of studies. His mind was always active, but the subjects of his study were regulated by his feelings. German poetry was then in a critical state. It was generally felt that the old bombastic manner must be shaken off before poetry could make any important progress. Precision and conciseness were then the great desiderata and Goethe soon learned to feel their importance. He began at this period what he practised throughout his life to embody in a poem, or in a poetical form, whatever delighted or grieved, pleased or displeased him; in a word, whatever occupied his mind intensely; and no one, perhaps, was ever more in need of such an exercise as his nature continually hurried him from one extreme to another. Several dramatic pieces were projected by him at this period when he first realized the immense difference between the form and the substance of religion, law, morals, in short, of all the great subjects which most deeply affect the well-being of man. The fine arts were not neglected and he zealously studied the first authors on this subject. He always had a taste for drawing and while in Leipsic also attempted engraving.

Improper diet and other causes now brought on a disease from which he had hardly recovered when he left Leipsic in 1768. His health was much impaired, and on his return home he was affectionately nursed by a lady named Von Klettenberg, and his conversations and correspondence with her were the origin of "Bekenntnisse einer schönen Seele" in his "Meister." At the same time this connection led him to the study of mystico-al-chemical books (the traces of which are so apparent in "Faust"), and also to chemistry. He was also led by the reading of several religious works to construct for himself a strange theological system, of which "New Platonism" was the groundwork. He subsequently went to the University of Strassburg to pursue the study of law according to the wish of his father, but gave in fact more attention to the study of chemistry and anatomy than to that of law. At Strassburg he became acquainted with Herder — a decisive circumstance in his life. Herder made him more acquainted with the Italian school of the fine arts, and inspired his mind with views of poetry more congenial to his character than any which he had hitherto conceived. While here, in the immediate presence of the renowned minster of Strassburg, Goethe wrote a short treatise on Gothic architecture. The treatise contains some views which he afterward abandoned. Here on French ground and so near to the confines of the French language, he shook off all his predisposition for the French character, and Shakespeare now began to have a powerful effect upon him. In 1771 he took the degree of Doctor of Jurisprudence and wrote a dissertation on a legal subject. He then went to Wetzlar, where he found in his own love for a betrothed lady and in the fate of a young man named Jerusalem the subjects for his "Werther." The attention of the public was first attracted to him by his "Götz von Berlichingen" (1773). "Werther" appeared in 1774. Not long after the publication of "Werther," Charles Augustus, the

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hereditary Duke of Saxe-Weimar, made the acquaintance of Goethe on a journey and when in 1775 he took the government into his own hands, he invited Goethe to his court. Goethe accepted the invitation, and on Nov. 7, 1775, arrived in Weimar. Shortly before he had made a tour in Switzerland with the brothers Stolberg. In 1776 he was made privy councillor of legation, with a seat and vote in the privy council. In the same year he made a second journey to Switzerland, on this occasion in company with the duke. In 1782 he was made president of the chamber and ennobled. In 1786 he made a journey to Italy, where he remained two years, visited Sicily, and remained a long time in Rome.

This residence in Italy had the effect of still further developing his artistic powers, by the contemplation of the treasures of art in that country, by intercourse with the society he met there, and by practice. Here his "Iphigenia" was matured, "Egmont" finished, and "Tasso" projected. The first of these was published in 1787, the second in 1788, and the third in 1790. These were the first works of consequence that had appeared from Goethe's pen since the publication of "Werther," and they were received with all the more astonishment and delight. They exhibit a mind arrived at its full maturity, and the influence of his Italian residence is seen in the ideality, or devotion to the purely beautiful which is characteristic of this period of his life. In the same year with "Tasso" was published the earliest form of the first part of "Faust," with the title "Dr. Faust, ein Trauerspiel," a poem in a dramatic form, which belongs rather to Goethe's whole life than to any particular period of it. The subject of this work had engaged the attention of Goethe very early, and continued to occupy his mind during his whole life; and the poem, even in its first form, was the result of many years' intermittent labor. It was made the depository of the author's most general views on the problems of existence; all that is highest and deepest, most beautiful and most touching in human life is here contained, along with what is tame and commonplace; and it is this universality of content, combined with the never-dying interest belonging to the general conception of the poem, the representation of the perpetual opposition between the demands of materialism and the demands of spiritualism, which makes this drama of Goethe's a true world poem. At the same time that Goethe was engaged in the production of the works of imagination just mentioned, he had been pursuing various other studies of a scientific nature with as ardent an interest as if these had belonged to his peculiar province. The result of these studies in botany was a work published also in 1790, "Versuch die Metamorphose der Pflanzen zu erklären," in which he gives expression to the view, since generally adopted by botanists, that the leaf is the primary form of a plant, and that the whole plant and its different parts may all be regarded as variously modified leaves. In the following year (1791) he began to apply himself to optics, and in 1791–1792 he published a work on this subject called "Beiträge zur Optik." On May 1, 1791, he became director of the court theater at Weimar.

In 1792 he followed his prince during the campaign of the Prussians against the revolutionary party in France, and was present at the battle of Valmy on Sept. 20. From this campaign he returned with a mind partly depressed by the want of success of the army to which he was attached and partly embittered by all that was going on around. He could not but feel abhorrence toward the violence and excesses of those who took part in the revolution, and yet he was in an equal measure disgusted at the corruption of courts and the insolence of the aristocracy which had brought it about. In this frame of mind the idea occurred to him of giving expression to his feelings by a modern version of the Middle Age satire of "Reineke Fuchs." This was the work of 1793. The year 1794 is an important epoch in Goethe's life, inasmuch as it was in the summer of that year that he contracted an intimacy with Schiller which gradually ripened into the warmest friendship, and only ended with the death of the latter in 1805. The two poets had met for the first time at Rudolstadt on Sept. 7, 1788, but at first they regarded each other with mutual coldness, amounting, on Schiller's part at least, even to aversion, though each acknowledged and esteemed the other's genius. This continued till at the date just mentioned, Schiller then living at Jena, not far from Weimar, started a literary periodical called the "Horen," to which he invited several of the leading writers in Germany, and among them Goethe, to contribute. Goethe willingly agreed, and at a meeting which took place soon afterward the poets first learned to understand one another, and ever after the intimacy was kept up by frequent visits and correspondence. This correspondence was afterward published with the title "Briefwechsel zwischen Schiller und Goethe in den Jahren 1794–1805."

The friendship between the two poets was in the highest degree beneficial to both. Goethe, to use his own expression, felt his youth renewed and was stirred up by the enthusiasm of the younger poet to fresh literary activity. Some of his finest ballads appeared in the "Horen" in the years immediately following. One effect of this friendship was that the peculiarly dramatic genius of Schiller roused afresh Goethe's interest in the stage, and both poets were now

Goethe

united in their endeavors to make the theater of Weimar the model for all Germany. Schiller produced at this period all his great masterpieces, most of which were first represented on the Weimar stage. In this department of literature the creative power of Goethe would appear not to have been the same as it had been. He produced no original drama, but he translated for the German stage Voltaire's "Mahomet" and his "Tancred." In 1794–1796 Goethe published "Wilhelm Meister's Lehrjahre," a novel which with its sequel "Wilhelm Meister's Wanderjahre" (1821), has become well known to English readers through the translation of Carlyle. His next work of importance was "Hermann und Dorothea" (1797), a narrative poem in hexameter verse, the characters of which are taken from humble life. In 1806 Goethe married Christiane Vulpius, with whom he had lived since 1788, and of whom he always spoke with warmth and gratitude for the degree in which she had contributed to his domestic happiness. In 1808 he published another edition of "Faust" in a considerably altered form. The same year is memorable in Goethe's life on account of an interview which he had with Napoleon, who was then attending the Congress at Erfurt. This interview was rendered all the more flattering to Goethe by the fact that Napoleon desired to see him not merely on account of the widespread fame which Goethe then enjoyed, but also on account of the personal admiration which he felt for him, and which he expressed in the greeting with which he met him, "*Vous êtes un homme.*" In this interview Napoleon expressed particular admiration for the novel of "Werther," which he said he had read seven times.

In 1809 was published "Wahlverwandtschaften," another novel, and in 1810 the "Farbenlehre" or "Theory of Colors," a work in which he had the boldness to oppose the Newtonian theory and to which Goethe himself attached great importance, although the theory therein promulgated has met with no acceptance among men of science. In 1811 appeared Goethe's autobiography, with the title "Aus meinem Leben: Dichtung und Wahrheit"; in 1819 the "West-östlicher Divan," a remarkable collection of Oriental songs and poems. Goethe's last work was the second part of "Faust," which was completed on the evening before the last anniversary of his birthday which he lived to see. This second part of "Faust" forms a remarkable contrast to the first, and is universally pronounced to be altogether inferior to it, though it shows the same perfect mastery of language and rhythm and is rich in beautiful passages and expressions. This work was not published till 1833, the year after his death. In the same year in which the second part of "Faust" was completed (1831) Goethe was greatly gratified by having sent to him on his birthday by 15 Englishmen, among them Scott, Wordsworth, Southey, Professor Wilson, Lockhart, and Carlyle, a seal bearing the inscription "Ohne Hast, ohne Rast" (without haste, without rest), taken from one of his own poems as a testimony of their esteem. The seal was accompanied by a complimentary letter composed by Carlyle.

If we survey the variety of the productions of this great man, not only in all branches of poetry, but also in natural science, we cannot help admiring the activity and versatility of his genius — his many-sidedness. His genius appears most wonderful if we throw a glance at what German literature was when he found it, and what it is now that he has left it, and how it has been affected by him. Goethe was born at a period when the modern German literature was far from having acquired independence and consistency; and in the different periods of his life it is easy to discover the influence at one time of French literature, at another of classic literature, etc.; but these influences, though sufficient to destroy the vigor and energy of many a genius, rather served to develop his powers more fully. It cannot be denied, however, that even he sometimes was led astray, as, for instance, in his polished and cold "Eugenie." But in what branch has Goethe most excelled? Is it the epic? He enriched German literature with some of the most popular epic productions; but his epic descriptions cannot rival the best descriptive compositions of English literature (which may be partly accounted for from the character of the two languages); nor are the conceptions of his epics of the highest character. Is it the drama? He produced some beautiful dramas, and his "Iphigenia" will always be considered as a masterpiece; but, generally speaking, his dramas do not give us sketches of great, important, or interesting characters, nor the picture of a great action — the two chief points of dramatic poetry; and he stands in this respect very far below Shakespeare. Nay, he does not even do justice to historical characters, as his "Egmont" shows. Is it didactic poetry? He wrote several didactic poems, but he cannot be said to have excelled in this branch. Is it the novel? He presented German literature with some novels which will always rank among the best; but their excellence, of which we shall presently speak, is not in the plot, nor particularly in the characters described. In short, what is the prominent feature of Goethe's excellence? We think Goethe must be called, preëminently, the poet of philosophy. It is the philosophy of life and of individual character pervading his works which places them among the first ever produced. Hence he has been able to devote his powers to all forms of poetry;

for the drama was not to him what it was to Shakespeare, nor the epic what it was to Ariosto. We do not say that his conceptions are in no degree affected by the dress in which they are clothed, but that the form of poetic composition, which he at any time adopts, remains with him more a matter of form than with those who are preëminent in any particular branch. Hence his greatest production is his "Faust," emphatically a philosophical poem, which will long remain unrivaled; for it is the best of Goethe's productions in a department for which he seems to have been born.

His beautiful songs and shorter poems, elegies, distichs, etc., have the same peculiar character; for though many or most of them cannot be called preëminently philosophical, yet they are tinged with the profound reflections of his philosophical mind, and continually remind us of the deep wells from which our griefs and joys, fears and hopes spring. The circumstance that there was in Goethe's time in Germany no national life, that no grand ideas affected the whole mass with a common impulse, that there are few historical recollections which are sources of a common pride to the whole nation — all this had a great influence on Goethe. It was one of the reasons of his universality, and also the reason that his genius directed itself to the delineation of the character of the individual man, considered apart from the influences which act so strongly upon the mind in communities more strongly imbued with a common spirit. In this respect he resembles not a little the poets and wise men of the East, who, under a despotism which crushes freedom of action, concentrate their thoughts on the inward man. Goethe, we repeat it, is the most universal poet; thoroughly modern in some of his inimitable songs, in which he gives vent to the tenderest emotions of the heart with a sincerity at times almost childlike; while in other productions he exhibits the spirit of ancient literature to a degree which probably no modern poet of any nation has reached, as the resemblance is not merely in the form, but in the very conception of the ideas. The service which Goethe has done to the German language is immense; he has elevated it and used it with that ease and freedom with which genius always handles its material. The clearness and simplicity of his prose style make it the best model for the imitation of his countrymen. It may perhaps be said with truth, that the deficiency of Goethe's productions in great national ideas, such as we find in the poets of other countries, was partly owing to his having passed a great portion of his life at the court of a petty prince. But still his whole organization fitted him to be the observer of individual and of social life in the world around him. His mind had no historical cast, and neither the progress of mankind in different stages of society, nor the great characters who have appeared as representatives of these stages seem to have excited a powerful interest in him. So, too, his own age seems to have passed by him without exciting in him that interest for either of the great contending parties, which is so strong in minds of a different mold.

The principal sources from which a knowledge of Goethe as an individual may be derived are the various published correspondences between him and various persons; for example, his letters to his friends at Leipsic in the early period of his life, his correspondence with Herder, with Frau von Stein, with Lavater, with F. H. Jacobi, with Merck, with the Gräfin Stolberg. For the later years of his life the chief source of information is Eckermann's "Gespräche mit Goethe" (vols. i. and ii. Leipsic, 1836; vol. iii. Magdeburg, 1848). This work has been translated into English by Margaret Fuller Ossoli (Boston, 1839). An admirable biography of Goethe by Lewes, which has obtained wide recognition even in Germany, was published in London in 1855. The editions of Goethe's works, both singly and collectively, are numerous.

Goeverneur, Jan Jacob Antonie (gö-ver-ner′), a Dutch poet; born in Hoevelaken, Feb. 14, 1809. His poems in serious vein appeared over the pseudonym of "Jan de Rijmer"; but they are not so meritorious as his verses for children, which the little people of the Netherlands now know by heart. He died in Groningen, March 19, 1889.

Goffe, William, an English parliamentary soldier, one of the judges of Charles I.; born about 1605. He became a major-general in the Parliamentary army, sat in the House of Commons and in Cromwell's "other house," and was one of the judges who signed Charles I.'s death-warrant. In 1660, with his father-in-law, Edward Whalley, he fled to America; they lay in hiding about New Haven from 1661 to 1664, when they went to Hadley, Mass. There they lived for many years in seclusion. According to tradition, when the townsmen were called from the meeting-house to repel an Indian attack, and were standing irresolute, Goffe put himself at their head and drove off the redskins, and then disappeared as suddenly as he had come. He died in Hadley, Mass., in 1679.

Gog and **Magog,** names several times used in the Bible, and given to the famous figures of giants in the Guildhall, London. Magog is spoken of by the writer of Genesis as a son of Japhet; Ezekiel speaks of Gog, Prince of Magog, as a terrible ruler in the far N., united with the Persians, Armenians, and Cimmerians against Israel; Gog

and Magog in the Apocalypse appear as coördinate terms comprehending all future enemies of the kingdom of God. The name Magog was often applied generally to all the unknown races N. of the Caucasus. The Guildhall giants are images of the last two survivors of a race of giants who inhabited Albion, descendants of wicked demons and the 33 infamous daughters of the Emperor Diocletian, who after murdering all their husbands sailed to Albion. These giants Brute and his Trojans finally overcame, leading the last two survivors prisoners to London, where they were kept as porters at the palace gate. Another account represents one of the giants as Gogmagog, and the other as a British giant who killed him, named Corineus. These giants have stood in London since the days of Henry V., and have witnessed all its history since. The old giants were burned in the great fire, and the new ones, which are 14 feet high, were constructed in 1708. The ancient effigies, which were made of wicker-work and pasteboard, were carried through the streets in the lord mayor's shows, and copies of the present giants were in the show of 1837.

Gogol, Nikolai (gō′gol), a Russian novelist and miscellaneous writer; born in the government of Pultowa, March 31 (N. S.), 1809. He is the author of a novel entitled "Dead Souls" (which was received with great enthusiasm by his countrymen, and was translated into English with the title of "Home-life in Russia"), of a comedy entitled "The Revisor," and two collections of short tales illustrative of rural life in Little Russia, his native country. The reputation of Gogol was seriously impaired by his subsequent writings, but some years after his death renewed interest was taken in his work; especially in the United States, where his books were largely translated. He spent some years abroad, returned to Russia in 1849, and died in Moscow, March 4 (N. S.), 1852.

NIKOLAI GOGOL.

Gogra (gog′rä), or **Ghagra** (ghäg′rä), one of the largest affluents of the Ganges, joining that river from the N. at the town of Chapra, after a generally S. E. course of 600 miles. It rises in the higher Himalayas, passes through Nepal, and after reaching the level land becomes the great waterway of the Northwest Provinces and Oudh. Its principal tributary is the Rapti, also of commercial importance.

Goil, Loch, a small but highly picturesque loch in Argyllshire, Scotland, a branch of Loch Long, 6 miles in length and less than 1 mile in breadth. Its shores are for the most part wild and rugged; but the general character of the scenery is modified by extensive natural woods of hazel. The mountains in the neighborhood rise to the height of more than 2,000 feet. Lochgoilhead is a favorite watering-place. It may be visited by steamers from Greenock (20 miles).

Goiorani, Ciro (gō-yôr-än′ē), an Italian poet and prose writer; born in Pescia, Jan. 21, 1834. He got into trouble with the authorities when a student at college in consequence of his political activities; and was in the same trouble more or less all his life, banishment resulting on two or three occasions. The volume of "Poems of a Tuscan Exile" adequately typifies his poetry. His prose was written mostly for political journals.

Goiter, or **Goitre** (Latin, *guttur* = the throat), same as BRONCHOCELE (*q. v.*). It arises from a morbid enlargement of the thyroid gland, causing an unsightly but painless deformity. It is more common among women than among men, in the proportion of about 12 to 1. It prevails chiefly, if not exclusively, in villages situated on or close to limestone rocks.

Gojam (gō-jäm′), a province of Abyssinia, lying S. of Lake Dembea; lat. 10° to 11° N., lon. 37° to 38° E. The surface is, in many portions, mountainous; in others it is diversified by hill and dale, affording good pastures, which are well watered by the various affluents of the Abai river. Pop. 71,000.

Golconda (gol-kon′dä), an extensive fortress of the Nizam, situated on a granite ridge, 7 miles W. of Hyderabad, India. In its immediate neighborhood are the ruins of an ancient city, once the metropolis of the powerful kingdom of Golconda, which reached its height at the close of the 16th century and endured till 1687. The place itself is still strong; but it is commanded within breaching range by the yet solid mausoleums of its former sovereigns, about 600 yards distant. The fort is held by a small garrison from Hyderabad, and serves as the Nizam's treasury, and also as a state prison. Golconda is proverbially famous for its diamonds; but in truth, they were merely cut and polished here. See DIAMOND.

Gold (chemical symbol, Au; at. wt., 187), a metal distinguished from other common metallic elements by its beautiful characteristic yellow color which it preserves untarnished on exposure to the at-

Gold

mosphere under nearly all conditions. Many alloys of copper with zinc, tin, and aluminum have also a more or less golden-yellow color, and are used as substitutes for and imitations of gold, being sold under various fanciful names, such as Dutch metal, Mannheim gold, Abyssinian gold, etc. Some of the bronzes have also a golden color. None of these resist atmospheric action like gold, but some are fairly permanent under ordinary conditions. Pure gold has a high metallic luster, but is inferior in this respect to steel, platinum, and silver. The metal possesses a higher specific gravity than any common metal, but is exceeded in this respect by platinum. The specific gravity varies from 19.2 to 19.4, and the metal is thus 1½ times heavier than lead and nearly twice as heavy as silver, bulk for bulk. Gold melts at 1045° C., being somewhat more infusible than silver and more fusible than copper. It does not melt in a common fire. At high temperatures the metal is sensibly volatile, and in the intense heat of the oxyhydrogen blowpipe or electric furnace may be vaporized. The vapor is purple.

The pure metal is somewhat harder than lead, but softer than copper, silver, platinum, zinc, or iron. It is consequently too soft, in the pure state, for the purposes to which it is generally applied. For practical application it is alloyed with copper or silver, and both these metals are often present. The former renders the gold redder and the latter paler than its true color. The proportion of gold contained in an alloy is expressed in degrees of fineness, or as "carats" and carat grains (4 grains = 1 carat). The fineness is expressed in parts per thousand, for example 916.6, or decimally .9166. The carat value of the gold is expressed in parts of 24, pure gold being 24 carats fine. Thus 9-carat gold contains 9 parts of pure gold and 15 of a mixture of copper and silver, etc., commonly known as alloy. Sovereign gold consists of 11 parts gold and 1 copper; guinea gold, of 11 parts gold, ½ part of copper, and ½ part of silver. Standard and guinea gold are thus 22 carats fine (the legal standard for coins in the United Kingdom and colonies), and contain only 2 parts of alloy. The German, American, and Italian standard is 21.6 carat, and is composed of 1 part copper and 9 gold. The following table shows the relative amounts of gold and baser metal in alloys commonly employed:

Carats Fine.	Pure Gold.	Alloy.	Fineness in Thousands.
24	24	—	1000.00
22	22	2	916.66
21.6	21.6	2.4	900.00
18	18	6	750.00
15	15	9	625.00
12	12	12	500.00
9	9	15	375.00
4	4	20	166.6

The lowest recognized standard is 9 carat, but much gold of inferior quality is worked up into ornaments and commonly sold as real gold. Derby gold is also a common name for this poor material. In the United Kingdom articles of jewelry, plate, etc., are stamped with certain marks known as hall marks, or plate marks, as a guarantee that they have the quality they profess to have. Tampering with hall-marked articles is an indictable offense. Many specious imitations of hall marks are put upon sham jewelry, but always differ in some essential feature. Gold alloys of a red character are frequently colored. This consists in treating the article chemically in such a manner as to dissolve out the base metal constituting the alloy, leaving a covering of purer gold, paler than the original. For this purpose the articles are boiled with 1 part of salt, 1 of alum, 2 of saltpeter dissolved in 4 parts of water, for 20 minutes. Rolled gold is produced by applying thin sheets of gold to a plate of alloy and rolling down the compound sheet.

Pure gold has a tenacity of about 7 tons per square inch, and elongates about 30 per cent. before breaking. A wire one-tenth of an inch thick will support nearly 200 pounds. Its alloys with copper and silver are stronger. Standard gold has a tenacity of 18 tons (Austen), and extends 34 per cent. before breaking. At very low temperatures this is greatly increased (Dewar). Gold is the most malleable of metals, and can be reduced to extremely thin leaves by hammering (see GOLD-BEATING). Such leaves sometimes do not exceed $\frac{1}{280000}$ of an inch in thickness, and transmit green light, though presenting an unbroken metallic surface. This is best seen by mounting on glass. The extreme thinness and high luster of the metal have led to its use as an illustration of the extreme divisibility of matter. A particle of gold weighing only $\frac{1}{2500000}$ of a grain is readily visible to the naked eye. A grain of gold can be made to cover nearly 80 square inches of surface. The malleability of gold is seriously affected by the presence of minute quantities of arsenic, antimony, bismuth, lead, sulphur, selenium, and tellurium. Of the last 0.2 per cent., and of bismuth 0.5 is sufficient to render the metal crystalline and brittle. Traces of the above elements unfit the metal for gold-beating and coinage. These are removed by passing chlorine gas through the molten metal, or by treating the molten metal with mercuric chloride (corrosive sublimate). By continued hammering the metal is slightly hardened, and must be annealed. Gold surpasses all other metals in respect of ductility. The extreme ductility of the metal is shown by the fact that wires less than $\frac{1}{20000}$ of an inch thick were obtained by Wollaston by encasing a wire of gold in silver and draw-

Gold

ing down the compound wire. The silver was dissolved off by treatment with nitric acid. A length of 500 feet of such wire weighs only 1 grain. Gold wire is used for making gold lace. Gold is also extremely flexible and tough. The pure metal breaks with a hackly fracture, but the appearance is greatly affected by impurities.

Chemical Properties.— Gold alloys readily with most metals. It is rapidly attacked by mercury, and dissolves in excess of that metal. If the liquid amalgam be squeezed through wash-leather a yellow pasty mass remains, which may be used in "wash" or "fire" gilding. This process, however, has been largely displaced by electro-gilding, in which the bath consists of the double cyanide of gold and potassium, and is used hot. The metal is unattacked by any of the simple acids, save selenic, but dissolves in any mixture in which chlorine, bromine, or iodine is liberated. The common solvent is aqua regia, a mixture of 1 part nitric acid and 3 or 4 of hydrochloric acid. The chlorine liberated from this mixture converts the gold into the trichloride, an exceedingly soluble body of high tinctorial power, yielding yellow solutions. In the finely-divided state gold is dissolved by chlorine water, bromine water, and iodine solution or tincture, the trichloride, tribromide, and triodide being produced. It also dissolves in potassium cyanide solutions (in the presence of air) and in cyanogen bromide. These solvents are employed in the extraction of gold from its ores. Oxides of gold can be prepared with some difficulty. The monoxide is thrown down when caustic potash is boiled with gold chloride solution to which a little acetate of soda has been added. A trioxide (Au_2O_3), a dioxide (Au_2O_2), and a tetroxide (Au_2O_4) are also known. What is known as fulminating gold, $Au_2O_3(NH_3)$, may be prepared by adding ammonia to a solution of gold chloride or by steeping the hydroxide in ammonia. It is a green or brownish powder, which detonates violently when gently heated or when struck. Two classes of gold salts exist. Of the aurous salts, the principal are sodium auro-sulphite, auro-thiosulphate, the cyanide and potassium auro-cyanide. Of the auric salts, the principal are the trichloride and the chlor-aurates. Gold trichloride crystallizes from solution in dark orange-red crystals, $AuCl_3 2H_2O$. It is extremely soluble in water, and volatilizes at 300° in a stream of chlorine gas, but is decomposed on heating to 200° in air with the formation of the monochloride and chlorine, and, at a higher temperature, of gold. It is soluble in ether, naphtha, and essential oils.

The chlor-aurates are combinations of gold chloride with sodium, potassium, and other alkaline chlorides. The best known are $KCl.AuCl_3.2H_2O$, and $NaCl.AuCl_3.2H_2O$, salts commonly sold as gold chloride for photographic purposes. Gold is precipitated from solution by most metals. Iron, copper, and zinc precipitate it readily, generally in a more or less pulverulent form devoid of metallic appearance. Oxalic acid, ferrous sulphate, sulphur dioxide, and sodium sulphite, carbon, grape-sugar, and many organic reducing agents, precipitate the gold from gold chloride. In some cases the metal is so finely divided that it imparts a ruby color to the liquid and does not settle for months. Purple of Cassius is the fine purple pigment produced by treating gold chloride solution with a mixture of tin chlorides, *i. e.*, stannous chloride containing a little stannic salt. It is used in glass staining, pottery, and enamel painting, and for coloring artificial gems, imparting a pink, rose, or red color. The addition of tin chloride to the solution obtained by treating an ore with aqua regia and boiling off the excess acid, is a delicate test for the presence of gold. Finely divided gold imparts to pottery and glass a color varying from pink to ruby. Gold resists chemical action to a greater extent than platinum or any other common metal, and in alloys protects base metals from the action of acids to a remarkable extent. Owing to the high specific gravity of gold (19.3) it is possible to roughly determine the richness of the alloy by taking the specific gravity of the article. This is impossible where platinum (sp. gr. 21.4) is present in the alloy. The specific gravity of standard gold is 17.157, and of 18-carat gold 16.8.

Assay of Gold.— The touchstone is employed to determine approximately the quality of the gold. It is a hard, black, siliceous or flinty slate known also as Lydian stone. Basalt and black Wedgwood ware are also employed. The metal to be examined is rubbed on the stone (any plating or coloring being first scraped off), and the streak compared with that made by needles of known composition differing from each other by one-half carat. The streak is also treated with nitric acid and a test acid, and the result of their action observed. Three or more sets of needles are employed, the chief being a gold-copper series, a gold-silver series, and a gold-silver-copper series. Sometimes five sets are employed, in which the proportions of silver and copper are varied. The series to which the article tested belongs is determined by comparison for color, hardness, and toughness, the latter being inferred from the dryness or greasiness of the streak. The streak is first treated with pure nitric acid (applied with a feather), which is afterward rubbed off. With brass and other spurious copper alloys the streak is completely and instantly dissolved, while poor gold leaves a very faint impression. Nitric acid does not affect any alloy above 15 carats fine. A test acid consisting of 98 parts nitric acid (sp.

Gold

gr. 1.34) and 2 of hydrochloric acid (sp. gr. 1.173) is used if the streak has been unaffected by the nitric acid. Gold of 18 carats fine and over is not affected by this mixture in the cold. This method of testing is only used when a rough idea of the richness is all that is necessary for valuation purposes.

Accurate assays of gold alloys are made by wrapping a weighed quantity (either 5 grains or 0.5 gram) in sheet-lead, with sufficient silver to equal three times the weight of pure gold present. Lead to the amount of 34 times the weight of the sample is used for all alloys containing less than 50 per cent. of gold, and less for richer alloys. The sample is dropped on to a bone ash cup (cupel) previously heated to full redness in a muffle furnace. The copper and all base metals in the alloy are oxidized, and the oxides dissolved in the molten litharge formed by the oxidation of the lead added. The fused oxides are absorbed by the porous cupel, thus keeping the metallic surface clear, and at the end of the operation only silver and gold remain behind. After cooling, the button is rolled into a ribbon, annealed, coiled up, and boiled first in nitric acid of sp. gr. 1.16, and afterward in nitric acid of sp. gr. 1.26, to dissolve out the silver, and, after washing, the coherent cornet of gold is heated to dull redness in an annealing cup and weighed. The addition of silver in assaying is known as inquartation. It is necessary owing to the protective action exerted by gold on other metals.

World Production of Gold.— Gold is very widely distributed, smaller or larger quantities being found in nearly every country. The ancients obtained gold from the Spanish Peninsula, Greece, Asia Minor, and India. The Ophir of the Bible has been variously located. Possibly it was in East Africa. In more modern times Peru, Bolivia, Brazil, Chile, Mexico, and other countries of South and Central America furnished immense supplies of gold after the discovery of America until about 1850. By far the greatest discoveries of gold have been made during the 19th century. The discovery of the Californian placers in 1848, and of the Australian placers in 1851, produced a mad rush to the diggings. In 1858 gold was found in New Zealand, and in 1861 the Otago district became a large producer. Since then immense developments have taken place. Besides California, Montana, Arizona, Colorado, Nevada, Idaho, and others of the United States have furnished, and still furnish large supplies, and Alaska must also be added. British Columbia is an important source, both alluvial and quartz mining being followed. Canada has also entered the lists as a gold-producer, and the phenomenal discoveries of rich alluvial deposits in the Klondike region in the Yukon basin still furnish excitement. The rich finds in Western Australia, in the Calgoorlie and Coolgardie districts, have recently placed that colony in the front rank as a gold-producer, while Victoria, South Australia, and New South Wales have long been large gold-producing countries. In Victoria much energy in the development, more especially of "deep lead" mining is being put forth. The Witwatersrand district of the Transvaal has sprung into importance since 1886, and Johannesburg is now perhaps the largest gold-mining center of the world. Russia is also an important producer, the gold being obtained beyond the Ural mountains. India also produces a considerable amount. Of the prospective gold fields the most likely are British Guiana, the hinterland of the Gold Coast, certain parts of China, and possibly East Africa. Gold has been found in several parts of the United Kingdom, principally around Dolgelly, in Merionethshire, in Sutherlandshire, in the Lead hills, in the Wicklow mountains and other places in Ireland. The production of gold in recent years is shown in the tables given below. Such figures, however, are all more or less uncertain.

	1896.	1897.	1999.
Country.	oz. fine gold.	oz. fine gold.	oz. fine gold.
South Africa	2,150,106	2,818,493	3,644,889
Australasia	2,185,872	2,690,278	3,777,559
Russia	1,041,794	1,121,511	3,164,603
United States	2,568,132	2,774,935	3,506,679
Other countries	1,874,171	2,075,495	3,081,454
	9,820,075	11,483,712	15,175,184
Value	£41,713,715	£48,780,511	£64,309,450

The great increase in the Australian yield is due to the activity in Western Australia; in the United States, to Colorado — which now excels California. Canada doubled her output in 1898 — the output being 701,459 ounces. This is due to the Klondike field. The crude bullion from the Transvaal in 1898 amounted to 4,545,014 ounces. In the decade 1831–1840 the value of the average annual gold production of the world was £2,831,800; from 1841–1850, £7,638,800, the California placers being by this time worked. In the period 1851–1855 the average annual value was £29,195,400, in 1881–1885 only £20,371,777. The phenomenal advance since 1885 is largely due to the development of the Transvaal, but since 1894 the United States, Australia (especially West Australia), and the Klondike region have greatly contributed to the increase.

The year 1909 was a record-breaker in the World's production of gold. The increase in production in the period of 1849-1909, as officially reported by British and American authorities for specified years, is shown in the following table:

1849	$27,100,000	1880	$106,436,000
1850	44,450,000	1890	118,848,000
1860	93,415,000	1900	254,556,000
1870	92,250,000	1909	460,299,200

The sources and values were:

Africa	$168,830,000
United States	99,232,200
Australia	71,980,000
All countries	460,299,200

The total world's production since the discovery of the metal in the United States was estimated in value at $13,000,000,000.

Production in the United States.—Of the total production in the United States in 1909 ($99,232,200), the Director of the Mint estimated the values by principal sources as follows:

Alaska	$19,460,000
Arizona	2,672,300
California	21,271,300
Colorado	21,954,700
Idaho	1,389,300
Montana	3,599,400
Nevada	14,908,400
New Mexico	278,300
Oregon	712,900
South Dakota	6,849,900
Utah	3,844,800
Washington	377,900

Gold Amalgam, a mineral composed of mercury, 57.40; gold, 38.39; and silver, 5. It is found in Colombia in white grains about the size of a pea, and in California in yellowish-white, four-sided prisms.

Goldbeater's Skin, the prepared peritoneal membrane of the cæcum of the ox. It is used to separate the leaves of gold while under the hammer; thus it is reduced to extreme thinness, and in this state it is used as an application to cuts and wounds.

Gold Beating, the art of hammering gold into leaves of extreme thinness. For this purpose pure gold is alloyed with small quantities of other metals according to the color required. Ten colors are recognized: Red, pale red, deep red, orange, lemon, deep pale, pale, pale pale, deep party, party, besides fine gold. In the deeper colors copper preponderates in the alloy, varying from ½ pennyweight to ¾ pennyweight per ounce, and no silver. The pale ones contain silver varying from a few grains to 1 pennyweight per ounce. The middle ones contain from three-quarters to a little over one pennyweight of alloy, of which two-thirds is silver and one-third copper. Ordinary gold leaf contains about 21 grains of alloy per ounce, and is thus nearly 23-carat fine. The operations are conducted as follows: The metal is melted and cast into ingots, which are rolled out into thin ribbons between polished steel rolls. Each ounce of gold is rolled to a length of about 10 feet, the ribbon being 1½ inch wide and 0.0015 to .001 inch thick. This is cut up into pieces, each weighing about 6 grains, so that two ounces — that is, "a beating"— yields 160 to 170 such pieces. These are packed between intervening sheets of vellum, some three inches square, the surfaces of which have been rubbed over with fine plaster of Paris — brime — to prevent the gold from sticking. A number of blank pieces of vellum are placed at the top and bottom of the pile, and the packet is bound with straps of the same material. The cutch thus formed is beaten with a hammer weighing from 17 pounds upward, or by a power hammer, till the gold has been extended to the size of the parchment sheets. The packet is then unbound, the gold squares each divided into four by a steel knife, and the pieces packeted between sheets of goldbeaters' skin about 4½ inches square. A number of blank skins are placed at both top and bottom. The 600 to 700 pieces are all put into the same packet, and comprise what is called the shoder. The shoder is secured by slipping the pile into a parchment band, and again into a similar one at right angles, and is beaten with a round-faced hammer weighing from 9 to 12 pounds till the gold has extended across the skins. When the gold has filled the shoder each leaf is divided into four pieces with a strip of bamboo sharpened on the long edge. The 2,500 to 2,800 pieces thus obtained are packed in three packets between fine goldbeaters' skin five inches square. Each of these packets constitutes a mold. A large number of blank skins are placed at either side. The packet is secured as before, and each mold is beaten with the "finishing" or gold hammer weighing from 7 to 10 pounds, till the metal extends to the edges of the skins, and in some places flows over. When the beating is finished the mold is opened. Each leaf is then lifted deftly by long wooden tweezers, placed, with a sudden downward movement on a leather pad dusted with brime, and from the central part leaves 3⅜ inches square are cut by means of two sharpened bamboo strips fastened parallel to each other. The leaves are placed by the tweezers in books of soft paper rubbed over with red ochre, red bole, and brime to prevent the gold from sticking. If the leaf does not lie flat, a sudden puff of breath, well directed in the center lays it flat. Each book contains 25 leaves. Fine gold is more difficult to deal with than that containing a little alloy, owing to its liability to stick when the leaves touch. It, however, beats equally well. The leaf begins to transmit light when $\frac{1}{150000}$ of an inch thick. Ordinary gold leaf varies from $\frac{1}{200000}$ to $\frac{1}{250000}$ of an inch thick.

Goldberg (gōld'berg), a town of Prussian Silesia, on the Katzbach, 13 miles W. S. W. of Liegnitz. It owes both origin and name to its former rich gold mines; suffered much from Mongols and Hussites, the Thirty Years' War, the campaign of 1813, and finally from great fires (1863–1874); and now has manufactures of cloth, flannel, etc.

Gold Coast. See GUINEA COAST.

Gold Coast Colony, a British crown colony on the coast of West Africa. Coast line about 350 miles; area, including Adansi, Ashanti, and the Northern Territories, about 120,000 square miles; pop. (1901) 1,696,965. The native state of Ashanti lies inland, at the back of the central portion of the colony. The products are chiefly palm oil, gold, palm kernels, rubber, timber, etc. Chief town, Accra; pop. 17,892. The government includes a governor, executive council, and a legislative council of nine, none of whom are elected.

Trouble arose between the King of Kumassi, who had declared himself King of Ashanti in 1894, and the British authorities and in 1895 an expedition was sent against him, under the command of Sir Francis Scott, which resulted in the submission of the king, who was afterward taken to the coast. The kings of Bekwai and Abodom also made their submission, and the country was placed under British protection, and a resident appointed at Kumassi. The Niger Convention drawn up by the Anglo-French Commission sitting at Paris, and signed June 15, 1898, settled the boundaries of the *hinterland* to the W. and the N. Bona and Dokta were given up to France, and the French had to concede Wa and other points to the E. of the Volta which had been occupied by them.

Gold Cure, a medicine discovered by Dr. Leslie Keely, of Dwight, Ill., for the treatment of the liquor, opium, and tobacco habits. See Bichloride of Gold.

Golden Age, in mythological history, the earliest period of almost all nations, in which those then existing were supposed to live in perfect innocence and the enjoyment of every pleasure, and when the earth produced all things necessary for their support, comfort, or enjoyment in the fullest abundance, and all animals were at peace with each other. The Egyptians believed in successive conflagrations and deluges occurring at uncertain intervals. These were designed by the gods to purify the earth from guilt. After each of these judgments man was again so regenerated as to live for a time in a state of virtue and happiness, after which degeneracy again established itself, continually gaining strength till the next catastrophe.

Golden Bay, the Bay of Rieselarke, so named because its sands glitter like gold.

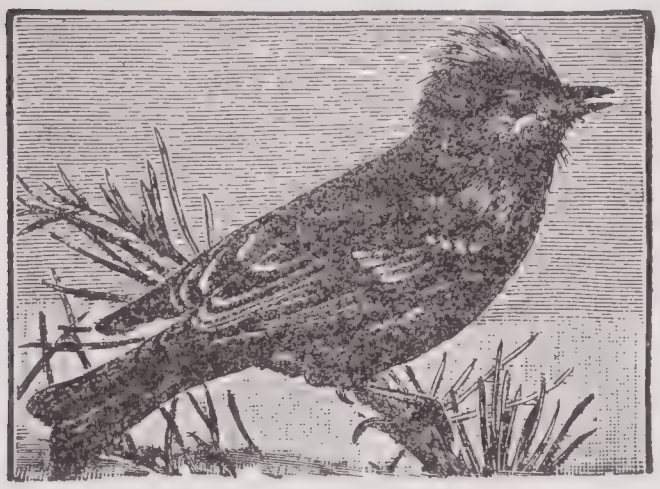
Golden Beetle, the name popularly given to many members of a genus of coleopterous insects, *Chrysomela,* and of a sub-family, *Chrysomelinæ,* belonging to the tetramerous section of the order. The body is generally short and convex, the antennæ are simple and wide apart at the base; some of the species are destitute of wings. None are of large size, but many are distinguished by their metallic splendor of color. The finest species are tropical, but some are found in Britain — *e. g.,* the golden *C. cerealis* with purple stripes found on Snowdon, and the brassy-green *C. polita* and *C. staphylea* commonly found on nettles in spring. In N. temperate countries some of the adults of the autumnal brood sleep through the winter, awakening in spring to reproductive functions. Some of them, in the larval state, commit ravages on the produce of the field and garden.

Golden Bull, a bull having a golden seal, issued by the German emperor, Charles IV. at the Diet of Nuremberg in 1356, and which became the fundamental law of the empire over which he ruled. Other bulls have also been called golden for a similar reason.

Golden Calf, cast by Aaron from the earrings of the people, while the Israelites were encamped at the foot of Sinai, and Moses was absent on the Mount. Ages after, Jeroboam, king of Israel, set up two idols in the form of a calf, the one in Dan and the other in Bethel. This almost incomprehensible degradation of human reason was, more particularly in the first instance, no doubt the result of the debasing influences which operated on the minds of the Israelites during their sojourn in Egypt where, amid the daily practice of the most degrading and revolting religious ceremonies, they were accustomed to see the image of a sacred calf, surrounded by other symbols, carried in solemn pomp at the head of marching armies; such as may be still seen depicted in the processions of Rameses the Great or Sesostris.

Golden=crested Wren, Golden=crested Regulus, or **Kinglet** (*Regulus auricapillus*), a beautiful bird belonging to the family *Sylviadæ,* distinguished by an orange crest. It is the smallest of British birds, being only about 3½ inches in length. The most usual haunts of the golden-crested wren are tall trees, particularly the oak, the yew, and the various species of pine and fir. In these it builds its nest, a very neat and elegant structure, the shape of which varies according to the situation in which it is placed. It is most commonly open at the top, like that of the chaffinch; but sometimes even under the sheltering boughs of a Norway fir it is covered with a dome and has an opening in one side. It is always ingeniously suspended beneath the branch, like those of many tropical birds, being the only instance of the kind among the birds of Great Britain. The eggs are 9 or 10 in number, and are small, round, and white. The golden-crested wren is by no means so shy of the neighborhood of man as is generally supposed. Though it abounds in forests, yet it equally frequents gardens, occasionally even in the suburbs of large towns,

and very often builds close to the house, most commonly in a yew or fir, at the height of 5 to 20 or 30 feet from the ground. It is very fearless of observers, and will allow you to approach within a yard of it, while engaged, as it generally is, in hunting for insects on the stems and branches of trees. Perhaps the best time for watching it is a hot sunny day in summer or autumn. In a still and sultry noon when not a leaf is stirring and almost every other bird has retired from the heat of the sun into the shadiest thickets, the little golden-crested wren is to be seen flitting noiselessly from spray to spray with unwearied activity, in search of its food, paying no attention to



GOLDEN-CRESTED WREN.

any one who happens to be watching it, and never for a moment remaining in a state of rest.

Its movements are unlike those of any other bird, except, indeed the blue tit — but even his do not equal in lightness and airiness those of this little wren. It flutters over the slenderest twigs like a butterfly — now on one side, now on the other — sometimes above the branch, sometimes beneath, hanging with the head downward — often at the end of it, suspended in the air by its tiny wings which it quivers without the slightest sound, so that unless you see it, if it were ever so close to you, you would not be aware of its presence except for the little low chirp which it occasionally emits, and which is more like that of an insect than a bird.

In shape and plumage, too, it is superior to most of the feathered inhabitants of our woods and gardens. The latter is a beautiful mixture of green and yellow with white bars on its wings; and on its head the golden crest, bordered with black from which it takes its name. In the spring and summer it sings regularly, beginning about the middle of March and continuing till the end of July. Its song is very soft and low, like a whisper, and, like that of the grasshopper lark, is no louder at the distance of one yard than of 20. During the greater part of the year it haunts tall trees, and never alights on the earth; but in the winter it is frequently seen pecking for insects on the grass or among dead leaves, and even on a heath at some little distance from any tree; and when thus engaged it will let you approach it sufficiently near to hear the little snap of its beak when it has found its prey.

Golden Eagle, or **Ring-tailed Eagle,** a North American bird, *Aquila canadensis,* sub-family *Aquilnæ.* It is 32 to 40 inches long, and the wing 35. The head and neck behind are light-brownish fulvous, the tail at base white, terminal portion glossy black, and all other parts purplish-brown. It has great power of flight, but not the speed of many of the falcons and hawks, and does not so readily pursue and capture birds on the wing; but its keen sight enables it to spy an object of prey at a great distance, and with meteor-like swiftness and unerring aim it falls on its victim. At times it soars to great heights, moving slowly and majestically in broad circles. The nest of the golden eagle is placed on a shelf of a rugged and generally inaccessible precipice. It is flat and very large, and consists of dry sticks. The eggs are two in number, 3½ inches long, and 2½ inches through, and dull white with undefined patches of brown. The golden eagle preys on fawns, hares, wild turkeys, and other large birds. It does not attain its full beauty of plumage till the 4th year. The so-called ring-tailed eagle is the golden eagle before it has reached maturity. The European golden eagle is so nearly like the American one, that there is a question whether it is not the same species.

Golden-eye Fly (*Chrysopa perla*), or **Lacewing Fly,** a neuropterous insect, common in Great Britain; pale green, with long thread-like antennæ, long gauze-like wings, and brilliant golden eyes. Its flight is feeble. The length, from the tip of the antennæ to the tip of the wings, is almost 1½ inches, but the insect without wings and antennæ is not more than one-third of this. The female attaches her eggs, in groups of 12 or 16, by long hair-like stalks, to leaves or twigs, where they have been mistaken for fungi. The larvæ are ferocious-looking little animals, rough with long hairs, to which particles of lichen or bark become attached; they are called aphis lions, and are very useful in the destruction of aphieds, on which they feed. The pupa is enclosed in a white silken cocoon, from which the fly is liberated by a lid. The general facts above stated are also true of another very common species (*Ch. vulgaris*) — a delicate green insect, with a body about half an inch long. The species of *Chrysopa* emit a very disagreeable odor. The nearly allied genus *Hemerobius* is also abundantly represented in Great Britain and elsewhere.

Golden Fleece. See FLEECE, GOLDEN.

Golden Fleece, Order of the. See FLEECE, ORDER OF THE GOLDEN.

Golden Gate, a channel two miles wide, forming the entrance to the Bay of San Francisco, and washing the N. shore of the peninsula on which San Francisco is built. It is defended by Fort Point, at the N. W. extremity of the peninsula, and by a fort on Alcatraz Island, inside the entrance.

Golden Horde, originally the name of a powerful Mongol tribe, but afterward extended to all the followers of Genghis Khan, and of Batu, the grandson of Genghis Khan, who invaded Europe in the 13th century. Under Batu the Golden Horde advanced W. as far as the plain of Mosi in Hungary, and Liegnitz in Silesia, at both of which bloody battles were fought in 1241. They founded the empire of the Kiptchaks, or the Golden Horde, which extended from the banks of the Dniester to the Ural, and from the Black Sea and the Caspian to the mouth of the Kama and the sources of the Khoper. This empire lasted till toward the close of the 15th century, when it was overthrown by Ivan III.

Golden Horn, the harbor of Constantinople, an inlet of the Bosporus, so called from its shape and beauty.

Golden House of Nero, a palace erected by Nero in Rome. It was roofed with gilded tiles, and the inside walls and ceilings were inlaid with gold, ivory, and precious stones. The Farnese princes subsequently used the materials of this costly structure to embellish their own palaces.

Golden Legend, the "Aurea legenda" of the Middle Ages, a work written by James de Voragine, Archbishop of Genoa, in the end of the 13th century. It is a hagiology or collection of lives of saints, and descriptions and histories of festivals. A translation of it was made and printed by Caxton in 1483. Longfellow made a portion of it popular by his poem of the same name.

Golden Number, for any year, the number of that year in the METONIC CYCLE (*q. v.*); and, as this cycle embraces 19 years, the golden numbers range from one to 19. The cycle of the Greek astronomer METON (*q. v.*) came into general use soon after its discovery, and the number of each year in the Metonic cycle was marked in golden colors in the Roman and Alexandrian calendars. Hence the origin of the name. Since the introduction of the Gregorian calendar the point from which the golden numbers are reckoned is 1 B. C., as in that year the new moon fell on Jan. 1; and, as by Meton's law the new moon falls on the same day (Jan. 1) every 19th year from that time, we obtain the following rule for finding the golden number for any particular year: Add one to the number of years, and divide by 19; the quotient gives the number of cycles and the remainder gives the golden number for that year; and if there be no remainder, then 19 is the golden number, and that year is the last of the cycle. The golden number is used for determining the Epact and the time for holding EASTER (*q. v.*).

Golden Palace. See GOLDEN HOUSE OF NERO.

Goldenrod (*Solidago*), a genus of *Compositæ*, closely allied to aster. Only the common *S. Virgaurea* is British, a few others are European, but most (more than 100) belong to North America, where their bright coloring lightens up the autumn scenery. Some — *e. g.*, *S. canadensis, grandiflora, etc.* — are found in old-fashioned borders, but are so coarse and weedy as hardly to merit a place beyond the shady corner of the roughest shrubbery. *S. Virgaurea* had at one time a great reputation as a vulnerary, whence probably the name (from Latin *solidare*, "to unite"). The leaves of this and a fragrant North American species, *S. odora*, have been used as a substitute for tea. They are mildly astringent and tonic.

Golden Rose, a rose of gold, or gilded, supposed to represent by its gold, its odor, and its balm, the Godhead, the body, and the soul of the Redeemer. It was sent at intervals by the Pope to sovereigns supposed to be more loyal than others to the Holy See. Among those sent were one to Henry VIII., in 1510; one to Frederick the Wise of Saxony, in 1519, to wean him from friendship with Luther; to Charles IX. of France, in 1572, just after the "massacre of St. Bartholomew"; one to the Queen of Spain in 1868; and more recently to Eugénie, while Empress of the French.

Golden Rule, a rule, so called on account of its excellent use in arithmetic, and especially in ordinary calculations, by which numbers are found in certain proportions — viz., having three numbers given to find a fourth number in proportion. See PROPORTION: RULE OF THREE. In morals, the rule laid down by Jesus in the Sermon on the Mount, and stated by Him to be the law and the prophets — *i. e.*, a summary of their teaching: "Therefore all things whatsoever ye would that men should do to you, do you even so to them" (Matt. vii: 12). This rule, almost axiomatic to a mind of keen moral sensitiveness, had already been "examined and adopted as a standard of ethics by westerns like Socrates and easterns like Theng-tsen, the disciple and friend of Confucius, some centuries before the birth of Christ. The latter tells us Toen-kousy asked, Is there a word in the language

which is of itself enough for a guide for our life? The wise man answered, There is; the word Chon, of which the meaning is that what we would should not be done to us let us not do to others."

Golden Saxifrage, the popular name for plants of the genus *Chrysosplenium*, a small genus of *Saxifragaceæ*, consisting of annual or perennial rather succulent herbs, with alternate or opposite crenate leaves, and inconspicuous greenish axillary and terminal flowers. They are natives of Central and Northern Europe, the Himalayas, and parts of America.

Golden State, California, so named on account of its rich auriferous deposits.

Golden Trumpeter, a South American bird, the agami, which emits a deep, rough sound, suggesting that of a trumpet. See AGAMI.

Golden Vale, the E. part of the vale of Limerick, Ireland. The soil is remarkably fertile.

Golden Wasps, one of the popular names for the hymenopterous genus *Chrysis*, or the family of which it is the type. They are not genuine wasps, one difference between the two being that the wasps proper have a sting, and the "golden wasps" only an ovipositor. See CHRYSIDIDÆ: CHRYSIS.

Golden Wedding, the 50th anniversary of a wedding, which is usually observed with more than ordinary festivity. The presents given to the couple should all be of gold.

Goldfinch, *Carduelis elegans*, a well-known bird belonging to the family *Fringillidæ*, and the sub-family *Fringillinæ*. Bill pale horn colored, the tip black, the circumference at its base crimson, nape of the neck white; the top of the head, carpal portions of the wing, the smaller wing coverts, and part of the surface of the primaries black; back and rump dusky brown, greater wing coverts, and part of the expanse of the others, gamboge yellow; under surface of the body dull white. It feeds on the seeds of thistles and other plants. It sings very sweetly. Its nest is neatly built of moss, twigs, roots, etc., and is lined with wool. It is situated in bushes, hedges, or apple or pear trees in orchards. The eggs are four or five, spotted with purple and brown.

Goldfish, the trivial name of a beautiful species of carp, found in the fresh waters of China. It is greenish in color in the natural state, the golden yellow color being found only in domesticated specimens, and retained by artificial selection. These fishes are reared by the Chinese in small ponds, in basins, or porcelain vessels, and kept for ornament. By careful selection many strange varieties and monstrosities have been propagated. They are now distributed over nearly all the civilized parts of the world, but in large ponds they readily revert to the color of the original stock.

Gold Furnace, a furnace for melting or reducing gold. It resembles a brass furnace, but is usually built above the floor, occupying one side or more of the shop, and appearing like a dwarf wall. The aperture for the fuel and crucible in each furnace is 9 to 16 inches square, and 11 to 20 inches deep. The front edge of the wall is horizontal and stands about 30 inches from the floor, but the top inclines backward at an angle of about 30°, and a ledge holds the tiles which close the tops of the furnaces. The crucibles are usually of black lead.

Gold Hill, a former village of Nevada, 7,000 feet above the sea, and about a mile S. of Virginia City, to which it has been annexed. It has rich silver mines, and several quartz mills. Here, on Mount Davidson, is the famous Comstock lode.

Gold Lace, a kind of lace made of gold wire, flattened between two polished steel rollers, into a ribbon which is twisted round a core of silk. The "gold wire" used in the manufacture of gold thread is nearly always in India, where a great deal is made, composed of pure silver with a thin coating of gold. But in European countries it is only the very best qualities of this wire which are made of unalloyed silver. A good quality of English gold thread is made from wire consisting of one part of copper added to 25 of silver, which is afterward coated with gold. But alloys of copper and silver in many proportions are used, some wire containing only one part of silver to 60 of copper. The silver, or alloy of copper and silver, is made into a rod 1½ inches in diameter, and then annealed and polished to prepare it for its coating of gold. This is laid on in the form of leaves of pure gold, and subjected, for the best qualities of wire, to the fire-gilding process—*i. e.*, the gold-coated rod is heated to redness on burning charcoal, which causes the leaf to adhere firmly. Rods so treated are next smeared with wax, and drawn through the holes of a steel drawplate (see WIRE-DRAWING). The wire is frequently annealed during the process of drawing, and this requires to be very skillfully done, or the golden tint of the surface is lost. Gold wire for thread is generally drawn down to a size measuring 1,100 to 1,400 yards to the ounce of metal. Finer sizes reach the length of 1,800 to 2,000 yards to the ounce, and to attain this fineness the wire is drawn through perforated gems, such as diamonds or rubies. The fine wire, after being annealed, is flattened between polished steel rollers. Finally the flat wire, or rather ribbon, is wound over yellow or orange colored silk, so as completely to envelop it, by a spinning engine. The gold

thread is then finished. Some of the best qualities of the metal covering or "plate" of this thread have 12 pennyweights of gold to the pound of silver or of alloy. Inferior kinds have as little as 2 pennyweights to the pound, and still cheaper sorts of thread are covered with flattened copper wire which has received a thin coating of electro-deposited silver, and this afterward receives, on the outside of the thread only, a still thinner electro-deposited coating of gold — two grains of the precious metal covering 3,000 square inches of surface. For this very cheap kind of thread yellow cotton is used instead of silk.

The only difference between gold and silver thread is that the thin coating of gold is wanting on the latter. Gold thread is used in the manufacture of military lace. This, however, is a woven substance and not true lace; but some real lace is made both of gold and silver thread. Both kinds of thread are also used for facings of liveries, and for ecclesiastical robes, altar cloths, and banners. These and other fabrics are either embroidered or woven, but often only in part, with the thread (see BROCADE: DAMASK: EMBROIDERY). Much of the "gold thread" used for theatrical dresses and decorations has only a covering of Dutch metal and the "silver thread" in these is spun with a covering of a cheap white alloy, having a mere film of silver on the surface.

Goldleaf. See GOLD BEATING.

Goldleaf Electroscope, an instrument for ascertaining, by means of goldleaf, the presence of electricity in a body. There is a tubular glass shade standing on a metallic foot in contact with the ground. In the tubulure of the shade, the neck of which is coated with insulating varnish, there fits a metal rod, terminating at the upper extremity in a knob, and holding at the lower end two narrow strips of goldleaf. The air in the interior is dried by quicklime or chloride of calcium. When the knob is touched with a body charged with positive or negative electricity the leaves diverge. To ascertain the kind of electricity requires a more intricate process.

Goldman, Emma, an American anarchist; born in Russia about 1868; emigrated to the United States and joined various anarchist societies; was arrested several times, and imprisoned for a year in New York city because of her destructive teachings. According to CZOLGOSZ (*q. v.*) her speeches incited him to assassinate President McKinley. Her harangues were hysterical and illiterate.

Goldmark, Karl, an Austro-Hungarian composer; born of Jewish parents in Keszthely, Hungary, May 18, 1832. He resided in Vienna. He became known in the United States by his operas, "The Queen of Sheba" and "Merlin," which was performed for the first time on any stage at the Metropolitan Opera House, New York, in 1887, and by the very effective overtures, "Sakuntala" and "Penthesilea." The "Country Wedding" symphony (more properly suite) is a great favorite. Picturesque originality and very skillful orchestration were Goldmark's best features.

Gold Mining, the process of extracting gold from the earth.

Occurrence of the Metal.— Gold is usually found in nature in the metallic or native state, and may be distinguished from iron and copper pyrites and other yellow metallic minerals by its malleability and softness. Native gold is never pure. Its quality varies from about 800 to 950 fine, or about 20 to 23 carats (see GOLD). Electrum is a native alloy of silver and gold about 500 fine. A native amalgam with mercury also occurs. The metal sometimes occurs crystallized in octahedra and other cubic forms. It is also found in irregular masses which may be nodular, filiform, or arborescent, or it may form thin leaves merely gilding the surfaces of the rock. More commonly it exists in grains irregularly distributed through sand, gravel, or rock. These grains are simetimes so minute as to be invisible to the naked eye, and the presence of gold can only be detected by subjecting the rock to a careful assay, either by grinding with mercury, washing, or fire assay.

The metal occurs in (1) alluvial deposits, or "placers." These are deposits of gravel, sand, clay, or loam, consisting of the debris of weathered rocks, generally transported by running water from hillsides to valleys and plains. They mark and follow the courses of existing rivers or of rivers belonging to former ages. Gold is found in them in all degrees of coarseness, from minute specks or "colors" to masses weighing many ounces. One of these, designated the "Welcome Stranger," found at Dunolly in Victoria, weighed 2,195 ounces Troy, and many others of large weight have been found.

These larger masses of gold have usually a more or less rugged and lumpy exterior, and are described as "nuggets." The largest usually occur near the source from which the gold in the alluvium has been derived. This source almost always consists of veins of quartz, or other material, occurring in one of the older rocks. Alluvial deposits vary in character from pipe clay to coarse gravel. The gravel is usually loose, but sometimes in working the deposits intervening layers are met with which are cemented together. These are known as "false bottoms." River sands also frequently contain gold. Alluvial deposits are often very rich, particularly in nuggets. This is largely due to the force of the water

carrying forward the light earthy material, while the larger and heavier particles, owing to their greater resistance, accumulate nearer the source. (2) The formation which is known as "deep leads" consists of ancient river beds that have been covered by more recent deposits of drift, earth, or volcanic rocks, which have become hardened and consolidated. They are composed of sand, gravel, loam, and clay, the so-called "wash dirt" or "pay dirt" varying from a few inches to several feet in thickness. Formerly these deep leads were the main drainage channels of the country, and in rain storms were heavily flooded, carrying the debris from the hillsides down the creeks and gullies. In Victoria the deep leads are often overlaid with a deposit of basalt known as "bluestone," showing volcanic action to have been instrumental in covering up the deposit. These deposits often extend out beyond the covered portion, and in mining operations trouble is occasioned by water which finds its way in through the exposed portion. Their direction is traced by boring. (3) In the primitive rocks gold occurs generally, though not invariably, in veins of quartz. The terms "lodes," "reefs," "ledges," are also used much in the same sense as veins. The metal is not uniformly disseminated through the rock, but occurs in most cases in rich streaks and pockets. Careful examination will often reveal its presence, but no general appearance of the quartz can be relied on. Highly mineralized quartz is generally most productive. The minerals usually present are silver, zinc, lead, copper, iron, nickel, bismuth, tellurium, and manganese-bearing minerals, the commonest being iron pyrites, mispickel, zinc blende, galena, copper pyrites, argentite and other silver ores, nagyagite and other tellurides, bismuthine, antimonite, and arsenide of manganese. Sometimes these — especially iron pyrites — are present in very large quantities. Near the surface this has been completely decomposed and partially converted into oxide of iron, conferring a reddish brown color on the more or less spongy rock. Such decomposed rocks containing much oxide of iron are described as "gossans." In the cavities small particles of free gold can often be observed. In the unaltered portions of the rock the accompanying minerals may be plainly distinguished. The veins may be compact and large, but the mineral streak often occupies only a portion of the lode, though many "leaders" may occur. Much of the lode is sometimes barren. In some quartz deposits the stone is uniformly rich; in others the gold is concentrated at certain points in what are known as pockets. According to a recent report from Cripple Creek, Col., a mass weighing over a hundredweight with a slight admixture of quartz has been found there. A similar mass of less size was found some years ago in India, and another near Sydney, N. S. W., was 5 feet high, 1 foot wide, and 6 inches thick, full of threads, wires, lumps, and sheets of gold. It realized £15,000. The "banket" ore of South Africa resembles both alluvial deposits and reefs. It consists of a mass of quartz fragments mostly irregular, embedded in a cement of mineralized matter which carries the gold. This, near the surface, is completely "weathered," and an incrustation of oxide of iron remains surrounding the quartz. Strangely enough this deposit resembles a reef rather than an alluvium and extends to great depths. Several "deep" mines are now in operation. No satisfactory explanation can be given of this formation. Ores of other metals frequently contain gold. Iron and copper pyrites, antimonite, galena, and silver ores are often gold bearing. The precious metal is extracted in the smelting of the mineral. Gold occurs also in combination with tellurium and possibly with selenium, as well as in the free state. Most telluric ores are gold bearing, and the presence of this element is often looked on as an indication of gold.

Placer Mining.— When the alluvium is at the surface the exploration of the ground can proceed forthwith, and with pick and shovel the gravel is turned over and the nuggets taken out. The remainder is afterward washed to recover the finer particles of gold, in the pan, the dolly, or the cradle. When the "pay dirt" is covered with soil, etc., the "cover" is first removed to lay it bare, and the washing proceeded with. From the above references the presence of water is a most important item in the satisfactory exploiting of alluvium. The washing of sands and gravels is a simple matter. In washing in the pan — "panning out" — a quantity of the dirt free from the stones is put into a shallow iron or wooden dish which is generally some 15 inches in diameter and has a slight depression in the middle. It is then mixed with water, and the dish put with its edge just under water with one side a trifle lower than the other. Any lumps are broken up by hand. By a gentle whirling and jerking motion the sand and other light bodies are washed over the edge of the pan, and the heavy matters containing the gold remain at the bottom and accumulate in the central depression. Pebbles are thrown out, and the "colors" (specks of gold) are then sought after and picked out, or the whole heavy residue saved, dried, and blown, or treated with a little mercury to extract the gold.

The "dolly" or "tossing tub" as it is styled, is intended for washing fine stuff or coarsely crushed material passing

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through a sieve having 12 meshes to the linear inch. It consists of a circular tub in which the dirt is mixed with sufficient water, and is stirred around with a shovel or other implement three or four minutes. A little of the water is then removed, and the tub struck on its sides for some few minutes with a hammer to quicken the subsidence of the heavy matters. The water is then poured off with the lightest matters, and the upper portions of the remaining mud scraped off and thrown aside. Some fresh dirt is added and the operation repeated. By this means a gradual accumulation of gold takes place at the bottom of the tub — or kieve, as it is called — and is removed from time to time. Some tossing tubs are provided with rotary stirrers.

The "cradle" consists of a short box or trough six or seven feet long, mounted on a kind of rockers, and slightly inclined to allow the mud to run off. A box with a bottom of iron plate perforated with half-inch holes is placed over the higher end of the trough. Underneath this an inclined plate directs the stuff to the top of the trough, across the bottom of which strips of wood called riffles, about half an inch thick, are fixed transversely to arrest the heavy particles of gold. The "pay dirt" is thrown into the box at the top, and water is led into or poured on it. The finer portion is thus carried through the holes into the trough. Lumps are broken up and the cradle rocked from side to side with a jerking motion. The light matters are carried away by the water from the lower end of the trough, and the particles of gold and other heavy matters lodge behind the bars and are afterward collected.

Sluicing.— This is the method adopted where practicable for treating alluvial deposits. The "sluices" consist of troughs called "flumes," in sections about 12 feet long, mounted on trestles to give a sufficient inclination—commonly estimated at from ¾ to 1½ inch to the foot. The lower ends of the troughs fit into the upper ends of the succeeding sections. The bottom of the sluice box is crossed transversely by bars of wood or iron. In long sluices these are about two inches thick and are supported by longitudinal bars, dividing the bottom of the sluice into rectangular spaces. The gravel is placed at the top and washed down by a stream of water while the lumps in the hand sluices are broken up by raking them.

The smallest of the sluices, known as the "long tom," and worked by two or three men, consists of two such sections. Into the upper one the gravel is thrown, and the lower end is closed by an iron grid set at an angle, to keep back the pebbles and large stones, while the sand, etc., passes through to the lower trough. In this it deposits its gold and heavy matters behind the riffle bars which in these shorter sluices are not so thick. The longer sluices, for dealing with larger quantities of material at a time, are made 250 feet long, or longer in many cases, and if there are many stones in the stuff to be treated, the sluice is divided into two sections, placed at different levels. The lower end of the upper section is not blocked, but near it the bottom consists of an iron grating — the "grizzly." The stones are washed forward over the grating, and fall or are raked out at the end. Under the grating is the second section of the sluice, often arranged at right angles, or to run in an opposite direction and with a smaller inclination. On this the sand and fine particles carried by the water fall, so that the smaller particles of gold may be recovered. In sluicing, mercury is often fed in at the top of the sluice in order to amalgamate the gold, and the amalgam then lodges behind the riffles. In other cases the fine sand, after passing through the first section of the sluice, falls on inclined tables covered with blankets, rough cloth, or hides with the hairy side up, over which it flows in a thin stream. These contrivances, known as "blanket strakes," serve to arrest and recover the fine gold. Amalgamated copper plates are employed for the same purpose in some cases, over which the fine sand flows before running to waste.

In dealing with the hard "cements" and "deep leads," the material is generally first treated by being passed through a "puddling" machine. In this the pay dirt is disintegrated by edge runners, or revolving rakes or harrows, or some other form of crushing or stirring apparatus, while a current of water carries the debris from the machine into the flumes and over the strakes. Much of the coarse gold remains in the puddling machine. Where the configuration of the ground admits, there is no difficulty in getting the necessary fall, but where the surface is level this has to be obtained artificially, by erecting very high poppet-heads over the shafts from which the pay dirt is drawn. In some cases these are over 100 feet in height, the puddlers being placed on a platform at a suitable elevation, from which the flumes slant downward, being carried on trestles.

Hydraulic Mining.— In places where the ground is suitable, these deep leads and other alluvial deposits are worked by washing down the gravel by means of a powerful jet of water, a head of 200 to 250 feet being sometimes employed. The jet is delivered from a movable pivoted nozzle — the "monitor" or "giant" — against the bank of auriferous material, and the detached debris washed into sluices where the gold is deposited. These sluices are larger than those already mentioned, being sometimes 5 to 6 feet in width, 2 to 3 feet deep, and are often paved with stone and provided

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with iron riffle bars. Some of them are upward of a mile long. Mercury is always fed in at the top, and the amalgam recovered by raising the riffle bars after turning off the water and cleaning out the gravel. An immense water supply is required for this purpose, and the water is often brought for miles in "flumes" which cross gulches and valleys supported on trestles, and are carried in tunnels through hills. This is the cheapest mode of working. From 2 to 4 grains of gold per ton, and in some few cases less, is sufficient to pay expenses. If the material is exceptionally hard, blasting is resorted to in order to break it down, when the action of the jet is sufficient to disintegrate it. A "miner's inch" of water is the quantity that will flow through a hole an inch square in an inch board, under a head usually of 7 inches, but more or less according to the locality, the time of flow being specified. A 24-hour inch at 7 inches pressure is nearly 14,000 gallons. In other cases an inch reaches 17,000 gallons. The river gravels of Scotland, Ireland, and Wales, and many parts of Europe, have yielded gold, but the richest of such deposits are those of California, Klondike, and Australia. Magnetic iron sand, tin stone, ilmenite, sulphides, garnets, and diamonds are often associated with alluvial gold.

Quartz Mining.— In dealing with the material from veins or reefs of quartz and other hard substances containing free gold, the stuff is reduced to fine powder and then passed, suspended in water, over copper plates amalgamated with mercury, to which the gold adheres. The "tailings" are then treated either by "concentration" and the concentrates chlorinated, or the whole of the tailings is treated by the cyanide process. The ore to be crushed is first passed through a "stone breaker" or "ore crusher." In the Blake type of this machine, the moving jaw permits the introduction of the larger lumps at the top, but only allows the crushed material to pass out at the bottom in pieces a little larger than walnuts. In the Gates type a gyrating cone revolves inside a fixed vertical cone. Both have ribbed surfaces, and they are of different angles, so that the large material introduced at the top is broken down before it can pass out at the bottom. The broken ore passes to the ore bins, thence to the feeders and on to the stamps, or some form of grinding mill. The ordinary gravitation stamp battery, as that most in use, has been selected for description here. The lower part of the battery consists of a cast-iron box—"mortar box"—fitted on one or both sides with a fine screen of wire-cloth or perforated sheet metal. At the bottom of this box is a row of iron blocks called "dies," on which the stamps fall. The stamps are heavy cylindrical cast-iron blocks — heads — to which are attached loose steel facing pieces — "shoes" — fixed to the lower ends of the vertical iron rods — stems — moving up and down between guides carried by the framing. The stamps are raised by cams keyed on the revolving shaft. These engage with collars — tappets — fixed on the stems. As the shaft revolves, the cam raises the stamp twice in each revolution and allows it to fall when the cam passes. The stamps are thus kept pounding away at the ore in the mortar box. The heads and their attachments weigh up to nearly half a ton, and make from 70 to 90 blows per minute. Five heads usually constitute a battery. Some mines have 200 stamps at work. Each head should crush about 1½ to 2 tons of ore per day. The motive power may be steam engines or turbines. Some mills are driven electrically. In wet crushing mills a stream of water is admitted to the mortar box, and carries the crushed material through the screens. Mercury is fed into the mortar boxes in small quantities, and much of the gold is retained there on amalgamated copper plates. Slightly inclined amalgamated copper plates arranged in steps are placed in front of the battery, and over these the crushed ore pulp passes slowly as it leaves the mortar box, the gold being retained by the amalgamated surfaces. The plate nearest the battery is generally heavily silver plated. The "tailings" which may still contain some gold are treated as described below. The stamp battery is often replaced by roller crushing machines and grinding mills of various types, the objects of which are the same; and with certain ores these are even more effective. The best known of these are Krom rolls and the Huntingdon mill. Steam stamps are also employed, making up to 200 blows per minute.

Treatment of Amalgam.— The amalgam, both that which is retained on plates placed in the battery and that which accumulates on the plates outside, is collected from time to time. The plate just outside on which the splash from the battery falls, is made small so as to be readily removable for cleaning up. The other plates are not so often disturbed. The amalgam is ground with water in a small iron pan with a revolving muller — "clean-up pan" — to cleanse the amalgam from sand, etc. Afterward it is pressed in wash-leather, canvas, or other material to expel the excess of mercury, which is returned to the battery as required. The residue is "retorted," that is, it is heated in retorts to expel the mercury, which is condensed and recovered. The gold obtained is subsequently melted in crucibles and afterward refined. "Free-milling" ores yield nearly the whole of their gold by this treatment. Ores containing sulphides, arsenides, antimony, tellurium, etc., do not, and are described as

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"refractory ores." Free-milling ores are generally "weathered"; the minerals having been decomposed by the action of the atmosphere and water.

Treatment of Tailings.— Tailings always contain gold, either as "float" gold, "rusty" gold, or bound up in pyrites or other mineral occurring in the rock. Pulp (that is, the crushed rock) containing float gold is led through amalgamating pans, where it is ground with mercury before running to waste. In dealing with pyritical ores, when chlorination or grinding with mercury is resorted to, the pulp is passed to concentrating appliances, blankets, strakes and "vanners" being employed. Of these means, vanners are by far the most effective and generally employed. Each consists of a slightly sloping table, formed of an endless traveling belt of india-rubber which is stretched over rollers at the ends of a frame, and so mounted as to be capable of violent agitation while moving slowly in an upward direction. The vibrations number 200 a minute. The pulp is led on at the higher end, and the flow of the water carries the light matters down the slope, the separation being greatly assisted by the shaking movement. The residue is also sprayed with water, and the heavy matters only are carried forward by the belt over the higher end and pass into a box below, being then known as "concentrates." These may be ground for a prolonged period with mercury (old fashioned), or they may be treated by the chlorination process. For the cyanide treatment, a full description of which is given below, concentration is unnecessary.

Chlorination Processes.— The concentrates are first calcined to remove the sulphur and arsenic, and to render the material more porous. The residue is treated in vats provided with false bottoms and with filter beds, or other suitable receptacles, having tightly fitting covers. The calcined ore, as free as possible from "slimes"— very fine material which becomes impervious when wet — is dampened with water and sifted into the vats, in order that it may lie lightly. The cover is put on and luted, but a plug in the top taken out. Chlorine gas is admitted slowly under the false bottom of the vat through a pipe for that purpose, and gradually lifts out the air. The plug is then inserted, and the chlorine allowed to act for some 30 to 40 hours, fresh supplies of the gas being added if found necessary. The vat is then ventilated, the cover removed, and the ore treated with water several times to dissolve the chloride of gold that has been formed. The solution drains through the filter bed, and passes out into the settling tank, where any sand, etc., is deposited. From the settlers it passes to the precipitating tanks, where a solution of sulphate of iron — ferrous sulphate — or other precipitant is added, and the whole thoroughly paddled or mixed by mechanical stirrers. The gold is thus precipitated as a brownish purple powder, which is allowed to settle, and the liquor is then siphoned off. Several batches of solution are thus treated, and the gold obtained is collected, washed with acids, dried, and melted in crucibles. Many modifications of the original process with special forms of plant have been introduced. In the Newberry-Vautin process air is pumped into the chlorinating vessel to increase the pressure; in the Pollok process hydraulic pressure and rotation are employed; and the Mears works under pressure of chlorine. In several of these modifications the chlorine is generated in the chlorinating vessel by means of bleaching powder, and either sulphuric acid or acid sulphate of soda. Various precipitants have also been employed. (See GOLD.)

Cyanide Process.— In this process, which is also known as the MacArthur-Forrest process, the whole of the tailings are treated with a weak solution of cyanide of potassium — or soda — containing about from 0.5 to 1 per cent. of the salt. The treatment is extremely simple. The tailings, free from slime, are placed in huge vats with false bottoms and filter beds, and the cyanide solution run in. It is allowed to act for from 10 to 20 hours or more, and then kept circulating by means of pumps. In about 2½ to 3 days the exhaustion is complete. The solution is then passed through troughs or boxes, in which are placed baskets filled with zinc shavings. These troughs are divided by stops into compartments which communicate with each other at the top and bottom alternately, so that the liquid flows up and down through successive compartments. The gold is deposited as a black powder on the zinc, and is recovered by shaking the baskets in clear water thus detaching the gold, and by cleaning out the mud at the bottom of the boxes. It is melted, strongly heated to volatilize the zinc, and treated with niter, etc., to oxidize and slag off as much impurity as possible. The bullion obtained is very impure, and the slags, which contain a quantity of gold, are sold to refiners, who smelt them with lead, which is afterward cupelled. The liquids from the boxes are reused, and, after determining the amount of cyanide they contain, returned to the tanks and made up to strength. The cost of the process is so small that very poor tailings pay for treatment. Refractory ores can also be treated direct, and with tailings there is no need for concentration. Some telluric ores yield their gold by this treatment. In dealing with certain classes of ore much cyanide is lost. Antimonial ores and those containing much copper pyrites and white iron pyrites and zinc sulphide

consume most. The pyrites oxidize, and the cyanide is decomposed by the soluble matters formed. Free acid also decomposes the cyanide. Lime is added to neutralize it. Sulman uses cyanogen bromide in place of cyanide. In the electrical process of deposition the gold is deposited on lead plates which occupy the boxes and form the negative electrode. These are insulated from the boxes which form the positive electrode. The bullion obtained is of course purer.

Pyritic Smelting.— This term is applied to a method of smelting pyritic gold ores in cupolas, with or without the addition of coke. If the ore contains above 40 per cent. of sulphur no coke is necessary. On charging the ore into the cupola some of the sulphur is driven off by the heat, and part of the remainder when it reaches the twyers burns and furnishes sufficient heat to melt the regulus — a sulphide — and slag off the ferrous oxide resulting, and the quartz. A plentiful supply of air is required. The gold remains in the regulus, which also contains any copper present.

Gold Refining and Parting.— The crude bullion is dealt with according to its purity. Very base bullion is cupelled with lead, only the silver and gold remaining on the cupel. When less impure it is melted in crucibles and niter and borax added to oxidize and flux the copper and other metals it contains. After this treatment the bullion still contains silver as well as small quantities of other metals, to separate which the gold is "parted." This is effected by boiling the alloy in acids to dissolve out the silver, but unless a sufficient quantity of silver is present the acid will not completely dissolve it. The gold is first alloyed with the necessary quantity of silver. For nitric acid parting the alloy contains 2½ to 3 times as much silver as gold. When sulphuric acid is employed it contains 4 times as much or more. The alloy is granulated by pouring the molten metal into water, and the granulated metal is then boiled with nitric acid in glass or platinum vessels, whereby the silver is converted into silver nitrate and dissolved, the gold remaining unattacked. After drawing off the solution the residue is washed, dried, and melted down. The silver in the solution is afterward recovered by precipitating it with hydrochloric acid as chloride, which is subsequently reduced to metal. At the same time the nitric acid is recovered. Sulphuric acid is often used in place of nitric, particularly in dealing with silver containing a little gold. The granulated metal is first boiled with sulphuric acid in iron pans, suitably provided with covers to carry off the vapors for the recovery of the acid. This converts the silver into soluble sulphate of silver. After a second treatment the residue is washed, dried, and melted down. The silver is recovered from the sulphate by treatment with ferrous sulphate or other reducing agent, or by passing the solution over metallic copper, by which it is precipitated. The precipitated silver is afterward washed and melted down. When little silver is present it may be removed by melting the gold in a crucible and bubbling chlorine gas through the molten metal by means of a clay tube passing through a hole in the cover. The silver is converted into chloride, which melts and rises to the top of the metal. The gold is not chloridized, the temperature being sufficient to completely decompose its chloride. The scum contains some gold, and this is afterward recovered. Besides removing the silver, any traces of lead, antimony, bismuth, tellurium, or other base metals which would render the metal brittle are converted into chlorides and volatilized, so that the metal is left tough and malleable. The process is often employed to toughen brittle gold. The employment of bichloride of mercury by goldbeaters to toughen the gold used for that purpose produces a similar effect, the chloride of mercury giving up half its chlorine for the purpose, and being volatilized as calomel. Platinum is separated from gold by alloying with so much silver as to reduce the platinum below 9 per cent. The alloy is then parted by nitric acid, when the platinum dissolves out with the silver. Osm-iridium, a hard alloy, which often occurs with alluvial gold, is removed from the metal before parting by allowing it to subside to the bottom of the pot after addition of silver. This it does owing to its being heavier than gold.

Gold Mosaic, a term generally applied to the bisulphide of tin, which has a metallic luster and color resembling the precious metal. It is also popularly used to denote an alloy of copper and zinc or tin, imitative of gold.

Gold of Pleasure (*Camelina*), a small genus of *Cruciferæ*. The common gold of pleasure (*C. sativa*) is an annual plant of humble appearance, but with abundant yellow flowers. It is most commonly known as a weed in lint fields, though it is also cultivated alone or mixed with rapeseed in parts of Germany, Belgium, and the S. of Europe for the sake of the abundant oil contained in its seeds. Its seeds and oil cake are, however, inferior to those of lint, and its oil is apt to become rancid and is less valued than that of rape or colza. The value of the plant in agriculture depends much on its adaptation to poor sandy soils, and on the briefness of its period of vegetation, adapting it for being sown after another crop has failed, or for being ploughed down as a green manure. The crop is cut or pulled when the pouches begin to turn yellow; but the readiness with

which seed is scattered in the field, rendering the plant a weed for future years, is an objection to its cultivation. The stems are tough, fibrous, and durable, and are used for thatching and for making brooms; their fiber is sometimes even separated like that of flax, and made into very coarse cloth and packing-paper. The seeds are used for emollient poultices. *C. dentata* is of similar habit and properties, but is not cultivated.

Gold Purse of Spain, the ancient province of Andalusia, so called because it is from thence that Spain derives much of its wealth.

Goldoni, Carlo (gol-dō′nē), a celebrated Italian writer of comedies; born in Venice, Italy, Feb. 25, 1707. He early showed a taste for theatrical representations, and, when scarcely 8 years old sketched a comedy, which excited the wonder of his relatives. A relative procured for him a place in the Papal College at the University of Pavia, from which he was expelled for writing scurrilous satires. After his father's death he settled as an advocate in Venice, but shortly took to a wandering life with strolling players, till in 1736 he married the daughter of a notary and settled down in Venice. Here he first began to cultivate that department of dramatic poetry in which he was to excel; namely description of character and manners. In this he took Molière, whom he began to study about this time, for his model. For five years he visited various cities of Italy, composing pieces for different theatrical companies, and for a time renewing his legal practice. In 1761 the Italian players invited him to Paris, where many of his pieces met with uncommon applause. He became reader and master of the Italian language to the daughters of Louis XV.; and received latterly a pension of 3,600 livres. At the breaking out of the revolution the poet lost his pension, and the decree of the National Convention of Jan. 7, 1793, restoring it and making up the arrears, found him already in the arms of death. His widow received the arrears and a pension for herself. Many of his pieces still appear on the stage. He died in Paris, France, Jan. 6, 1793.

Goldsborough, Louis Malesherbes, an American naval officer; born in Washington, D. C., Feb. 18, 1805. He distinguished himself in 1827 by rescuing the English brig "Comet" from a Greek pirate whose men numbered five times his own. In September, 1861, he commanded the North Atlantic blockading squadron, and gave the advice which resulted in the Burnside expedition and the capture of Roanoke Island. He became rear-admiral July 16, 1862, and died Feb. 20, 1887.

Goldschmidt, Madame (gōld′shmit), maiden name JENNY LIND, a famous Swedish vocalist; born in Stockholm, Sweden, Oct. 6, 1820. At 3 years of age she could sing correctly any piece she had once heard, and at 9 she was placed under Croelius, a famous teacher of music. Count Pücke, manager of the court theater, felt disinclined to act on Croelius's recommendation of his youthful pupil, on account of her want of personal attractions; but after hearing her sing, he caused her name at once to be entered at the Musical Academy, where she made rapid progress. She acted repeatedly in children's parts on the Stockholm stage till her 12th year, when her upper notes lost their sweetness. For four years she studied music theoretically. Her voice having recovered, she appeared at the Royal Theater, Stockholm, as Agatha, in "Der Freischütz," in 1838, and for 1½ years she continued the star of the opera at Stockholm. Having, by a series of concerts in the principal towns of Norway and Sweden, obtained the means of going to Paris, she studied under Garcia. A year after her arrival in Paris, she was introduced to Meyerbeer, who was anxious to engage her for Berlin, but she preferred returning to her native city, where she enjoyed a great triumph on her reappearance. In 1844 she went to Dresden, and afterward to Frankfort, Cologne, and Vienna. She first appeared before a London audience in May, 1847, as Alice, in "Robert the Devil," followed by a series of unparalleled triumphs in "Somnambula," "The Daughter of the Regiment," "Puritani," etc. She visited New York in 1850, under the auspices of P. T. Barnum, and was enthusiastically received, but dissolved the engagement prematurely in 1851, was married to M. Otto Goldschmidt, a skillful pianist and conductor, and retired from the stage. She reappeared in 1855, in 1861, in 1863, and in 1880, for a limited period. She was Professor of Singing at the Royal College of Music, 1883–1886. She died in Wynd's Point, Malvern, England, Nov. 2, 1887.

Goldschmidt, Meier Aaron, Danish novelist; born of Jewish parents, in Vordingborg, Oct. 26, 1819. In 1840 he founded what became the most famous of Danish newspapers, "The Corsair," celebrated for its brilliant wit and audacious satire. In 1845 he published his first novel, "A Jew," which was translated into English and several other European languages. In 1847 he published a collection of short stories, and began the issue of another newspaper, "North and South." His chief novels are: "Homeless," "The Heir," "The Raven," and "The Vacillator." He also published a series of short stories of Jewish life, and a play, "The Rabbi and

the Knight." His style is said to be the most graceful in the language. He died in Copenhagen Aug. 15, 1887.

Goldsmith, Oliver, a British author; born in Pallas, Longford, Ireland, where his father, the Rev. Charles Goldsmith, held the living of Kilkenny West in connection with the Established Church, Nov. 10, 1728. In June 1744, he was entered as a sizar at Trinity College, Dublin. In 1749, shortly after his father's death, he left Dublin, and was advised by an uncle, who had already borne a large part of the expenses of his education and who always remained his warm friend and helper, to prepare for holy orders. When the requisite two years of probation were over, Goldsmith made application to the Bishop of Elphin, but his application was refused. He then became tutor in a family, but soon lost his situation on account of a dispute with the master of the house over a game of cards. After this he thought of sailing for America, but after taking out his passage allowed the vessel to set sail without him. The same uncle who had given him assistance before now gave him £50 to go to Dublin to study law, but he had scarcely arrived in the city when he lost the whole sum in gaming. In spite of his repeated imprudences he was once more succored by his uncle, who supplied him with means to go to Edinburgh to study medicine. Here he remained 18 months, during which he acquired some slight knowledge of chemistry and natural history. At the end of this period he removed to Leyden, again at the expense of his uncle. After studying in that university for about a year he left it in February, 1755, with only one clean shirt and no money in his pocket to make the tour of Europe on foot, and actually traveled in this way through Flanders, part of France, Germany, Switzerland, and Italy. It was probably at Padua that he took a medical degree, as he remained there six months;

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but his uncle dying while he was in Italy he was again obliged to travel on foot to England, and reached London in 1756 with a few pence in his pocket. The story of George Primrose in the "Vicar of Wakefield" has been supposed to be autobiographical and perhaps too much stress has been laid upon this theory by those who have attempted to construct a narrative of Goldsmith's travels. Certainly we owe many lines in the "Traveler" to the poet's own experiences.

A fellow collegian, Dr. Sleigh, assisted him and recommended him as an usher to a school. He remained but a short time in this situation and then took lodgings in London to follow the profession of an author. He conducted a department in the "Monthly Review," wrote essays in the "Public Ledger" (afterward published under the title of the "Citizen of the World"), and a weekly pamphlet, entitled the "Bee." In 1761 he was introduced to Dr. Johnson. In 1764 he appeared as a poet by the publication of his "Traveler." The celebrity which this poem procured its author was the cause of his introduction to the most eminent literary characters of the day. In 1766 appeared his well-known "Vicar of Wakefield," which at once secured merited applause. In 1768 his comedy of the "Good-natured Man" was acted at Covent Garden with but indifferent success, and he applied to the more certain labor of a "Roman History," of which he afterward published an abridgment. His poetical fame was greatly enhanced by the publication of his "Deserted Village" in 1770, for which he could hardly be induced to take the proffered recompense of £100, till satisfied that the profits of the bookseller could afford it. In 1771 appeared "The Haunch of Venison," a poem, and a "History of England," based on the works of Rapin, Carte, Smollett, and Hume. In 1773 he produced his comedy of "She Stoops to Conquer," which was completely successful. He did not, on this account, neglect compilation and besides a "Grecian History" he supplied the booksellers with a "History of the Earth and Animated Nature," composed out of Buffon and others, in a manner which was both amusing and instructive. In debt for upward of $10,000, and more truly lamented than any literary man of his generation, he died in London, England, April 4, 1774.

Goldstücker, Theodor, a German Sanskrit scholar; born of Jewish parents, in Königsberg, Prussia, Jan. 18, 1821. He studied there, at Bonn, and at Paris, and established himself as privat-docent at Berlin. He went to England in 1850, and in 1852 was appointed Professor of Sanskrit in University College, London, a post he held till his death, March 6, 1872. Founder of the Sanskrit Text Society, he was an active member of the Philological and Royal Asiatic Societies. Of his separately pub-

lished works the most notable are "Panini: His Place in Sanskrit Literature" (1861); the Sanskrit text of the "Jauninîya-Nyâya-Mâlâ-Vistara" (completed by Professor Cowell); and part of a great Sanskrit dictionary. He projected numerous other works, including a text of the "Mahâbhârata," for which he had made vast collections of materials. He died in London March 6, 1872.

Gold Thread, in ordinary language, a flattened, silver-gilt wire, wrapped or laid on a thread of yellow silk by twisting with a wheel or bobbins; also called gold wire or spun gold. In botany, the *Coptis trifolia*, a ranunculaceous evergreen, so called from its yellow fibrous roots.

Gold Tooling, in bookbinding, ornaments impressed by the hot tool on gold-leaf laid on book covers, causing the metal to adhere. In contradistinction to blind tooling, which is the tool mark without the leaf. The gold is fixed to the surface of the leather by gold size, and the surplus is wiped off after the tool has been applied.

Gold Wire, gold reduced to the form of wire. Gold wire, so called, has usually a core of silver and is made by preparing a round bar of silver, plating it thickly with gold, and then drawing it through a series of holes of gradually decreasing diameter. The gold may be .01 of the thickness of the silver at first, and shares all its mutations in the drawing, retaining the same relative thickness.

Goletta, the port of the city of Tunis, from which it is 11 miles N. In the new quarter are the bey's palace, a large dock, and an arsenal defended by a battery. Pop., usually about 3,000, trebled during the visit of the bey in the bathing season.

Golf, a game of ball, in which the bats are loaded sticks with a little curve at the end for striking the ball on the ground, or elevated on a little mound, or tee, as it is called in the language of the game. Golf clubs are of varying weights and forms, according to the taste and requirements of the players. The balls are made of composition, and when skillfully driven, seem to fly like bullets through the air, making a free field absolutely necessary to the safety of players. Golf, in its aristocratic development, is an expensive game, requiring facilities, in the way of grounds and attendance and leisure, which do not fall in the lines of every one; yet it is democratic in all its practical features, requiring skill in handling the clubs and may be cultivated in every village and on every abandoned farm.

Golf is identified with Scotland, by reason of its great popularity in that country for upward of 500 years. As early as 1457 the Scotch Parliament felt called on to discourage golf because the absorbing interest of the people in the game diverted attention from the more warlike sport of archery, and diminished the power of the people to preserve their national independence. The source of the game is generally admitted to be Dutch. A game called "kolf," resembling golf, and played on the ice, was an ancient pastime in Holland and Belgium. The simplicity of the game is attractive to beginners, but with a little experience the beginner learns how necessary are practice, skill, and judgment to make one play well enough to be classed as a good golf player.

The chief requisites of the game are thus set forth by Thomas Bendelow, who did much to make it popular in the United States: The prime necessity for golf is plenty of room, and there are few parts of the country that will not furnish this requisite. It may be played on any good stretch of meadow where the grass is not too rank, but the ground best suited for the purpose is a reach of undulating country with a sandy soil, short, crisp turf, and plenty of holes or ruts. The latter, which form the bunkers or obstacles, are necessary to prevent the game from being too easy. The course, called "links," should not be less than 3 miles round nor more than 5. Throughout it are distributed 18 artificial holes at any distance from 1 to 500 yards apart. The holes are 4½ inches in diameter, and each is surrounded with a "putting green," a space 60 feet square and as smooth as possible. The other requisites are two small balls about two inches in diameter and made of gutta-percha, and a number of "clubs" adapted to the various contingencies likely to arise. The object of the game is to knock the ball with the sticks into the series of holes in the least number of strokes. The game can be played either by two persons, each having his own ball and counting by holes, not by the strokes taken for the whole round — this is called singles, or foursomes, two persons playing against another two, the partners playing alternate strokes, each side having its own ball. At the beginning of the game the player puts a little pat of sand down on the "teeing ground" (the pat is the "tee"), sets the ball on the top, and strikes it as far as he can in the direction of the first hole. After that, until he holes the ball, he must play it strictly from the place it happens to be. Here is where the bunkers come in, for a ball may land in a ditch or under a bank, where it may take him many strokes to get it into open ground again, and he may be called upon to use many different kinds of clubs, according to the nature of the ground and

his distance from his object. The object of the putting green which surrounds the hole is to give the player a smooth space, enabling him to aim with accuracy. Having "holed" his ball, the player takes it out, tees it again, and starts out for the next hole. A good driving stroke from a tee would be 200 yards. But a record of 280 yards has been made at St. Andrews, Scotland.

There are two styles of clubs, the wood and the iron, the latter having the head shod with steel. Altogether there are 19 shapes of clubs, but six are usually sufficient for a man's needs. The different clubs are used under different circumstances; for example, a putter for playing short strokes on the putting green; a cleek for drives; the driving iron when it is advisable to make a long drive, lifting the ball moderately high, the lifting iron when it is required to pitch the ball very high; the niblic for raising a ball out of ruts; the driver for long drives from a tee.

Goliardery, the name given to the series of satirical Latin poems directed against the abuses of the Roman Church in the 13th century. From a classical standpoint, the majority of them are generally below criticism; from a moral point of view they are vigorous and healthy, though in studying them 20th century readers must bear in mind the great jealousy of monastic orders which has in all ages existed among the secular clergy, and the tendency in minds ecclesiastical to exaggerate into grave sins what ordinary men would be inclined to consider as mere peccadilloes.

Goliath (gō-lī'ath), a giant of Gath slain by David (I Sam. xvii.). His height was "six cubits and a span," which, taking the cubit at 21 inches, would make him a little over 11 feet. The Septuagint and Josephus read, "four cubits and a span."

Goliath Beetle (*Goliathus*), a genus of tropical lamellicorn beetles, in the subfamily *Cetoniidæ*. They are distinguished by their large size, by the horny processes on the heads of the males, and by the toothed lower jaws or maxillæ. Several species frequent tropical and South Africa, and related genera occur in tropical Asia. The male of the largest form, *G. druryi*, from the Gold Coast, measures about four inches in length. In color, as well as size, these goliaths and their relatives are splendid insects. The family *Cetoniidæ* is familiarly represented in Europe and Great Britain by the rosechafer (*Cetonia aurata*).

Goll, Jaroslav (gōl), a Czech poet and historian; born in Chlumetz, July 11, 1846. His "Poems," in one volume, include some very popular "Songs of the Exiles." His historical works, among them "The French Marriage: France and England, 1624 and 1625," are important and popular. He was Professor of History at the Czech University in Prague.

Golomynka (*Comephorus* or *Callionymus baikalensis*), a remarkable fish, found only in Lake Baikal, the only known species of its genus which comes near the gobies, but is the type of a distinct family. It is about a foot long, is destitute of scales, and is very soft, its whole substance abounding in oil, which is obtained from it by pressure. It may be almost said to melt into oil on the application of fire. It is never eaten.

Goloshes, a word introduced into the English language from the French *galoche*, but originally derived from the Spanish *galocha*, meaning a wooden shoe or clog. It was formerly applied by the English to a kind of wooden clogs. The name is now restricted to overshoes, now generally made of vulcanized india-rubber.

Golovin, Ivan (go-lo-vēn'), Prince Hovna, a Russian author; born about 1813. Becoming implicated in the Polish troubles in 1848, he took refuge in England, where he became a naturalized citizen in 1853. His chief works are "Spirit of Political Economy" (1842); "Peter the Great" (1844); "Russia under Nicholas I." (1845); "The Caucasus" (1853); "Progress in Russia" (1859); etc.

Golt=schut, a name colloquially used for a small ingot of gold. Also an itzebu; a silver coin in Japan, worth 44 cents.

Gomarites, the followers of Francis Gomar, who was born in Bruges, Jan. 30, 1563, and in 1594 was appointed Professor of Divinity at Leyden, obtaining as his colleague in 1603 the celebrated Arminius. Gomar was strongly Calvinistic, and opposed the views of his associate with much zeal. When Arminius, about a year before his death, presented a remonstrance to the States-General, Gomar and his followers came out so strongly on the other side that they were called Anti-Remonstrants. Gomar was present at the Synod of Dort in 1618, and there and elsewhere was so distinctly the leader of the Calvinistic opponents of Arminius that the Anti-Remonstrants were often called Gomarites.

Gomato (gō-mä'tō), or **Gomuti** (gō-mö'tē) **Palm,** the *Saguerus saccharifera*, or *Areng*, a species of trees found in the Moluccas and Philippines, which supplies abundance of sugar. Palm sugar is generally obtained from the juice which flows from different palms on wounding their spathes and adjacent parts. It is commonly known in India by the name of jaggery. The juice of the gomuti palm, when fermented, produces an intoxicating liquid or toddy. In Sumatra it is termed neva, and a kind of arrak is distilled from it in Batavia. From

the trunk of this palm, when exhausted of its saccharine juice, a good deal of our commercial sago is obtained. A single tree will yield from 150 to 200 pounds of sago. The juice of the fruit is very acrid. The stiff strong fiber known under the name of gommuti, or ejow fiber, is obtained from the leaf-stalks, and is extensively used in the manufacture of cables and various kinds of ropes.

Gombroon, called also BENDER ABBAS, a seaport of Persia, in the province of Kirman, on the Strait of Ormuz, opposite the island of that name. Bender Abbas owed its name and importance to Shah Abbas, who, assisted by the English, drove the Portuguese in 1622 from Ormuz, ruined that seaport, and transferred its commerce to Gombroon.

Gomer, according to Gen. x. 2-3, the eldest son of Japheth. The identity of Gomer with the classical Cimmerii (*q. v.*) has been established. In Armenian, Cappadocia is still called Gamir.

Gomez (gō'meth), **José Miguel,** a Cuban patriot; born in Santa Clara Province, about 1855; son of a large cattle raiser; acquired a good education; early joined the insurgent forces; became a division commander in the revolution of 1895-1898; was governor of Santa Clara Province, and a member of the Assembly and the Constitutional Convention after the Spanish-American War; was unsuccessful candidate for the presidency in 1905; and was elected president of the republic in 1908.

Gomez y Baez, Maximo (gō'meth-ē-bā'āth), a Cuban patriot and general; born in Bani, Santo Domingo, in 1826. He served as a lieutenant of cavalry in the last Spanish army sent to occupy the island of Santo Domingo (*q. v.*). Afterward, while serving in Cuba, he became disgusted at the treatment of Cuban refugees by General Villar, assaulted that officer, and resigned from the army to become a planter. Joining the Cuban insurrection of 1868-78, known as the Ten Years' War, he was made a colonel by Gen. Carlos de Cespedes (*q. v.*), and actively entered the campaign. His daring operations and successful engagements brought about his appointment as commander-in-chief of the Cuban forces on the death of General Agramonte in 1873. When peace was signed with General Campos in 1878 Gomez went first to Jamaica, thence to Santo Domingo, where he lived on his farm until 1895, when the second revolution broke out. He again assumed command, and with an army about one-fifth the size of the Spanish forces he carried on a successful guerrilla warfare with the object of driving the Spaniards from Cuba. In 1898 he coöperated with the Americans at the time of their intervention, and used his great influence in maintaining amicable relations with the United States. On Feb. 24, 1899, after marching through Havana at the head of his soldiers, he was received by the American military authorities. In the following month he was deposed from supreme command by the Cuban Assembly, because he had accepted $3,000,000 from the United States Government for his soldiers. In the work of reconstruction on the island his services were invaluable to the American governor-general. During 1900-01 Gomez was conspicuously mentioned for the presidency of the Cuban Republic. The city council of Havana afterward granted him the summer palace of the former Spanish governor-general. He died there, June 17, 1905. See CUBA.

Gompers, Samuel, an American labor leader; born in London, England, Jan. 27, 1850. He came to the United States in 1863 as an apprentice to the cigar-making trade. In 1864, a mere lad, he became the first registered member of the Cigar-makers' International Union; subsequently he was its secretary and president, and through his efforts it grew to be one of the most successful of American trades unions. He was one of the founders of the American Federation of Labor, and was elected vice-president in 1881. From 1882, with the exception of the year 1894, when he was defeated by John McBride, the coal-miners' representative, he was president of the Federation. (See LABOR, AMERICAN FEDERATION OF.) Laws passed at his instance are the eight-hour law for government work, the ten-hour law for street railway employees, and the law making the first Monday in September a legal holiday, known as "Labor Day." He was a prominent figure in the settlement of the anthracite coal-miners' strike in 1902; and he also became a member of the committee of the National Civic Federation for the adjustment of disputes between capital and labor. (See UNIONISM.) His writings consist principally of pamphlets on labor questions and the labor movement in general. He also edits the "American Federationist," the official organ of the American Federation of Labor.

Gomphiasis (-fī'a-sis), a disease of the teeth, causing them to loosen and fall out of the sockets.

Gompholite, the name given by Brongniart to conglomerate rocks of Tertiary age, called in Switzerland Nägelfluh.

Gomphosis (-fō'sis), a kind of articulation or impaction by which the roots of teeth are implanted in their sockets.

Gomul Pass (gō-mul'), a pass across the Sulaimān range, from the Punjab into Afghanistan. It follows the course of the Gomul river, and is an important trading highway.

Gonaives (gō-nä-ēv′), a seaport of Haiti, on a beautiful bay on the W. coast, with an excellent harbor, 65 miles N. N. W. of Port au Prince. It exports coffee, cotton, logwood, and hides. Pop. (1897) 18,000.

Goncharóv, Ivan Aleksandrovich (gōn-chä-rov′), a Russian novelist; born in Simbirsk, June 18, 1812. On completing his university studies at Moscow, he obtained a post under the government and was sent to Japan in its service. He studied languages and translated numerous masterpieces of literature into Russian, but soon began the production of works of his own. These include "Jean Podzabryn," a tale of life among the high functionaries of the empire, and "Oblómof." He died in St. Petersburg, Sept. 27, 1891.

Goncourt, Edmond and **Jules de,** French novelists and brothers; the former born in Nancy, France, May 26, 1822, the latter in Paris, Dec. 17, 1830. They became celebrated as the joint authors of a number of famous writings, including "History of the French Society During the Revolution and Under the Directory" (1865); "Well-Known Portraits of the Eighteenth Century" (1878); "History of Marie Antoinette" (1858); "The Mistresses of Louis XV." (1860); "The Art of the Eighteenth Century" (1874); "Ideas and Sensations" (1866); etc. Jules died June 20, 1870; Edmond, July 16, 1896.

Gondar (gon′där), the capital of Amhara in Abyssinia, on a basaltic hill 23 miles N. of Lake Tzana. It was formerly the residence of the emperor, and at one time had about 50,000 inhabitants. The hill is crowned by the ruin of the old castle, built by Indian architects under Portuguese direction; burned by Theodore in 1867, and now left to the bats and hyenas.

Gondinet, Edmond (gôn-dē-nā′), a French dramatist; born in Laurière, March 7, 1828. His early comedies, "Too Curious" and "The Victims of Money," were received with a favor which led to his writing regularly for the stage; and the farce "Christiane" in 1871 approved him as one of the first members of his profession. He drew best from Parisian social life; "Panazol," "Papa's Convictions," and "The Ladies' Professor" afford typical examples. His pieces written in collaboration yielded enormous royalties, especially "The Happiest of the Three." He died in Paris, Nov. 19, 1888.

Gondola (gon′dō-la) (Italian diminutive of *gonda* = a boat), a Venetian boat. A gondola of middle size is 30 feet long, 4 feet beam, and is rowed by one man, known as a gondolier, standing at the stern and using one oar, or by two men, one at each end. each using a single oar. It has seats amidships, some of which have covers. In Venice they are all painted black. The stem and stern rise in pointed elevations, the former being surmounted by the ferro, a bright iron cleaver. Also a flat-bottomed boat for carrying produce and goods, or a railway platform car, with low or no sides.

Gonds, a Dravidian people, the most important of the non-Aryan or aboriginal hill races of the Central Provinces of India. They probably entered the country at an early period from the N., and gave their name to Gondwana, which comprised the greater part of the Central Provinces; but it was only from the 16th century to the Mahratta invasion in 1741–1781 that they ruled the central tableland. Today they number about 1,500,000, and, while the wilder tribes cling to the forest, the rest have made some advances in civilization. Most of the upper classes are of mixed blood, and many of the race have embraced Hinduism. Each village worships the three or four deities it knows best. Cholera and smallpox are worshiped everywhere, and the Gonds people the forest, the rivers, and every rock with evil spirits. The name Gondwana is still applied to the tract which they principally inhabit.

Gondula, one of the Celtic war goddesses; her special office was to conduct to Odin the souls of those who fell in battle.

Gonepteryx (-ep′ter-icks), a genus of butterflies, family *Papilionidæ*, sub-family *Pieridi*. *G. rhamni* is the brimstone butterfly. Its wings have an angular projection, and are brimstone-colored. Expansion of wings about 2½ inches. It is velvety-looking, dark green, with a pale line on each side.

Gonfalon, or **Gonfanon,** a small flag fixed to the pole of a lance. It differed from a banner in this respect, that, instead of being square, and fastened to a tonsure bar, the gonfalon, though of the same figure, was fixed in a frame made to turn like a modern ship's vane, with two or three streamers or tails. The object of the gonfalon was principally to render great people more conspicuous to their followers, and to terrify the horses of their adversaries.

Gonfalonier (ēr′), a standard-bearer; the person intrusted with the public gonfalon in mediæval Italian cities.

Gong, a musical instrument used principally in the East. It is tambourine-shaped, a disk of thin bronze with an upturned flange forming a rim. The metal consists of 78 parts copper, 22 parts tin. The bronze is of such proportions as to be naturally brittle when cast. Gongs are beaten with a padded drumstick, and are used in the East for making signals and adding intensity to the clangor of martial music. The gong has no distinct or appreciable note, but gives out a sound consisting of a

combination of harmonics. Also a stationary bell whose tongue is moved by a wire or string; commonly used as an alarm or call-bell on steamers.

Góngora y Argote, Luis de (gon'gō-rä ē är-gō'tā), a Spanish poet; born in Cordova, Spain, June 11, 1561. Intended for the law, he gave himself to poetry instead. He entered the Church in 1606, gaining in consequence a petty clerical post at the court of Philip III., from which he retired disheartened. Now began that singular stream of verse to which he owes his place in letters; the dominant traits in which are studied artificiality, extreme pedantry and obscurity, and violent metaphors. Gongorism, as it was called, had a horde of imitators, spread rapidly from Spain to France, and spoiled the style of a whole generation in both countries: "The Story of Polyphemus and Galatea" and "The Story of Pyramus and Thisbe" are its choicest expositions by its originator. He died in Cordova, May 24, 1627.

Gongonha, a kind of holly, *Ilex gongonha,* used in Brazil for making tea; it is diuretic and diaphoretic.

Gongora, a fine genus of orchids, tribe *Vandeæ.* They have lance-shaped leaves more than a foot long, and drooping flower racemes two feet. About 12 species are known. They grow on stems in tropical America.

Goniatites, a genus of fossil cephalopodous mollusca, belonging to the same family as the ammonites. The genus is characterized by the structure of the septa, which are lobed, but without lateral denticulations, as in ammonites; they consequently exhibit, in a section, a continuous undulating line. Some forms with slightly waved septa approach very near to the nautilus. The siphonal portion is shorter than the sides, forming a sinus at the back, as in the nautilus. The last chamber, the one tenanted by the animal, occupies a whole whorl, and has besides a considerable lateral expansion. The shells are small, seldom exceeding six inches in diameter. This genus is confined to the Palæozoic strata: nearly 200 species have been described from the Devonian, Carboniferous, and Triassic systems.

Goniometer (-om'e-ter), an instrument for measuring angles, and specially those of crystals. There are two forms of it, the common and the reflecting goniometer. The former was invented by Carangeau; it is now rarely if ever used. The reflecting goniometer is founded on the reflecting power of the polish on the natural planes or fracture surface of minerals.

Goniopholis (-of'ō-lis), a genus of fossil crocodiles, placed by Sir Richard Owen under his sub-order *Amphicœlia,* and by Professor Huxley doubtfully under that which he terms *Mesosuchia.* The remains on which the genus was founded were found in 1835 in a quarry near Swanage. The species is *G. crassidens,* sometimes called the Swanage crocodile.

Gonolobus (nol'-) the typical genus of the tribe *Gonolobeæ.* It consists of twining or shrubby plants, common in the United States, with racemes, or corymbs of greenish or dingy purple flowers. About 60 species are known. The juice of *G. macrophyllus* is said to be used by the North American Indians to poison their arrows.

Gonsalvo, or **Gonzalo of Cordova, Hernandez d'Aquilar,** a Spanish general, called "The Great Captain"; born near Cordova, Spain, March 16, 1453. He was of noble family, and at an early age entered the army. He first distinguished himself in the great war of Ferdinand and Isabella with the Moors, which ended with the conquest of Granada in 1492. His next achievement was the recovery of the kingdom of Naples from the French, who conquered it under Charles VIII. in 1495. When Louis XII. renewed the invasion of Italy, Gonsalvo was again sent there, and, after a temporary division of the country between France and Spain, he again expelled the French, established the Spanish rule, and was named viceroy of Naples. Through the jealousy of Ferdinand, and the calumnies of the courtiers, he was deprived of his office in 1507, when he retired to Granada, and died there Dec. 2, 1515.

Gonville and Caius (kēz) **College,** a college of Cambridge University, England, founded in 1358 by Edmund Gonville, of Terrington, Norfolk. In 1558 Dr. Caius obtained the royal charter by which all the former foundations were confirmed and his own foundation was established. By this charter the college was thenceforth to be called Gonville and Caius College.

Gonzaga (gon-zä'gä), a princely family which gave a line of dukes to Mantua and Montferrat. The sway of this race over Mantua extended over a period of three centuries, and many of its members were magnificent promoters and cultivators of art, science, and literature. The Gonzagas gradually monopolized all the chief posts of command, both civil and military; in 1432 they were invested with the title and jurisdiction of hereditary marquises, and in 1530 with that of dukes or sovereigns of the state. After their elevation to ducal dignity they were the faithful champions of the imperial interests in their policy with other states. The house of Gonzaga and that of the Visconti Dukes of Milan were perpetually at war. The marquisate was granted to Giovanni Francesco in 1433.

The 10th and last Duke of Mantua, Ferdinando Carlo, who had countenanced the French in the War of the Succession, was deprived by the Emperor Joseph I. of his states, and placed under the ban of the empire. He died in exile in 1708, leaving no issue. A branch of the family ruled Guastalla till 1746.

Gonzaga, Luigi, known as **St. Aloysius,** a Roman Catholic saint; born in the castle of Castiglione, near Brescia, Italy, March 9, 1568. Renouncing his marquisate of Castiglione in favor of his brother he entered the Society of Jesus in 1585. At Rome during a visitation of the plague he gave himself up with wonderful self-devotion to the care of the sick; and, stricken by the malady, died June 21, 1591. He was beatified in 1621, and canonized in 1726.

Gonzaga, Thomaz Antonio, a Portuguese poet; born in Oporto, Portugal, in August, 1744. Graduating from Coimbra, he emigrated to Brazil and became a judge for some years. Here he conceived a violent passion for one Doña Maria Seixas, whose connection with the development of his genius suggests the relation of Lesbia to Catullus, giving birth to his celebrated "Marilia." These love poems are the most exquisite lyrics in Portuguese literature, flawless in meter and immaculate in style. The marriage was prevented by his banishment to Mozambique on a seemingly trumped-up charge of treason, and a fever there left him permanently insane. He died in Mozambique, Africa, in 1807 or 1809.

Gonzalés, Emmanuel (gôn-zä-lās′), a French novelist of Spanish origin; born in Saintes, France, Oct. 25, 1815. On very little capital and no encouragement he founded the "Review of France," and established his fame as a writer of fiction in its columns. Émile de Girardin engaged him for the "Press," where he made the hit of a season. "An Angel's Memoirs," "Buckingham's Seven Kisses," "The Russian Princess," and "The Gold Seekers," are among the romances in which he most happily shows his genius for narration, vivid style, and fertility of expedient. He died in Paris, Oct. 15, 1887.

Gonzalez, Manuel (gōn-thä′leth), a Mexican military officer; born near Matamoros about 1833; fought with distinction in the war against the French and Maximilian. He participated with Diaz in various revolts; was his secretary of war in 1877–1880; and succeeded him as president in 1880. After his retirement he was governor of Guanajuato. He died in Mexico City, May 8, 1893.

González del Valle, José Z. (del vä′lā), a Spanish author; born in Havana, Cuba, in 1820. He was Professor of Natural Philosophy in the University of Havana till failing health compelled him to relinquish this post. He was appointed honorary secretary to the queen. Among his novels are: "Luisa," "Carmen and Adela," and "Love and Death" (1839); "Tropicales," a volume of poems (Havana, 1842); "European Journeys" (1843); "A Funeral Wreath" (1844); "Historical Sketch of Philosophy" (1848); and "Lectures on Meteorology" (1849). He died in Madrid, Spain, October, 1851.

Gonzalo de Berceo (gōn-thä′lō dā berthā′ō), a Spanish poet; born in Berceo, about 1196. He was parish priest of Berceo, and one of the first rhymesters to write in Castilian. He wrote in rhymed quatrains and there are extant more than 13,000 of his verses on the lives of obscure Castilian saints, on the Mass, the dolors of the Virgin Mary, the Judgment day, etc. His style is rude and inelegant, but the poet writes out of a full simple heart, and he tells a story well. He died in the monastery of San Millan de la Cogolla, about 1270.

Gooch, Sir Daniel, an English engineer; born in Bedlington, England, Aug. 24, 1816; was superintendent of the motive department of the Great Western Railway in 1837–1864; member of Parliament in 1865–1885; one of the chief movers in the establishment of the first transatlantic cable; and the inventor of many improvements in locomotive construction. He died in Clewer Park, England, Oct. 15, 1889.

Good, James Isaac, an American clergyman; born in York, Pa., Dec. 31, 1850; was graduated at Lafayette College in 1872, and later at Union Theological Seminary. In 1893 he was made Professor of Dogmatics and Pastoral Theology in Ursinus College, Philadelphia, Pa. He is the author of "Origin of the Reformed Church of Germany"; "History of the Reformed Church of Germany"; "History of the Reformed Church in the United States"; etc.

Good, John Mason, an English physician and writer; born in Epping, Essex, England, May 25, 1764. He was apprenticed to a surgeon-apothecary at Gosport, next continued his medical studies in London, and commenced practice as a surgeon in Sudbury in 1784. He removed to London in 1793, where he combined medicine with the most miscellaneous literary activity. In 1820 he took his M. D. degree at Marischal College, Aberdeen. His writings embrace poems, translations of Job, the "Song of Songs," and "Lucretius," essays on prisons, medical technology, and the history of medicine. He collaborated with Dr. Olinthus Gregory and Newton Bosworth in the "Pantalogia or Encyclopædia, comprising a General Dictionary of Arts, Sciences, and General Literature," completed in 1813. His

ambitious poem. "The Book of Nature," was published in 1826. He died Jan. 2, 1827.

Goodale, Elaine, MRS. EASTMAN, an American poet; born in Mt. Washington, Mass., Oct. 9, 1863. She became a teacher in the Hampton Institute in Virginia, and wrote editorially for the "Southern Workman" (1883). In 1885 she visited the Great Sioux reservation, reporting her views to New York and Boston journals. She taught school at White River Camp, Lower Brulé Agency, Dakota; and in 1891 married Dr. Charles A. Eastman, a full-blood Sioux Indian, in New York city. She achieved fame as a writer at an early age. Her "Journal of a Farmer's Daughter" was published in 1881. Together with her sister Dora Read, she produced: "Apple Blossoms: Verses of Two Children" (1878); "In Berkshire With the Wild Flowers" (1879); and "Verses From Sky Farm" (1880).

Goodale, George Lincoln, an American botanist; born in Saco, Me., Aug. 3, 1839. He was graduated at Amherst in 1860, and at the Harvard Medical School in 1863. For some time he was a lecturer in medical schools in Maine. In 1871 he was appointed Professor of Natural Sciences in Bowdoin College. After 1872 he was connected with Harvard University, at first as instructor and later as Professor of Botany. Among his works are: "Concerning a Few Common Plants" (1879); "Physiological Botany" (1885); "Wild Flowers of America" (1886); "Useful Plants of the Future."

Goodall, Edward, an English engraver; born in Leeds, England, Sept. 17, 1795. He was self-taught, and early in his career attracted the notice of Turner, a number of whose pictures he engraved, including the large plates of Tivoli and Cologne, and various plates in the England and Wales and Southern Coast series. He also engraved many plates for the Annuals, and the largest number of the landscapes after Turner that illustrate the elegant editions of Rogers' "Italy" and "Poems." He engraved a number of plates for the "Art Journal," several from pictures by his son, Frederick Goodall, R. A., of which the "Cranmer at the Traitors' Gate" and the "Happy Days of Charles I.," are the most important. He died in London, April 11, 1870.

Goodall, Frederick, an English painter, son of the preceding; born in London Sept. 17, 1822. He was only 17 years of age when he exhibited his first picture at the Royal Academy, "French Soldiers Playing Cards in a Cabaret." "The Return From a Christening," which received a prize from the British Institution, "Tired Soldier" (1842), "Village Festival" (1847), "Hunt the Slipper" (1849), "Raising the Maypole" (1851), and "Cranmer at the Traitors' Gate" (1856) are among the best of his early pictures. A visit to Venice and Egypt in 1857–1859 led him to turn his attention to Italian and Oriental subjects, such as "Reciting Tasso" (1859), "Song of the Nubian Slave" (1864), "Rising of the Nile" (1865), "Mater Dolorosa" (1868), "Sheep-Washing Near the Pyramids of Gizeh" (1876), "Daughters of Laban" (1878), "Return From Mecca" (1881), "Flight Into Egypt" (1885), etc. He was elected a Royal Academician in 1863. He died July 29, 1904.

Goode, George Brown, an American naturalist; born in New Albany, Ind., Feb. 13, 1851; was graduated at Wesleyan University in 1870. He became connected with the scientific staff of the United States National Museum in 1873; was made assistant secretary of the Smithsonian Institution in 1887. His publications include "Museums of the Future" (1890); "Principles of Museum Administration" (1895); "Catalogue of the Collection to Illustrate the Animal Resources of the United States" (1876); "The Fisheries and Fishery Industry of the United States"; "American Fishes: A Popular Treatise Upon the Game and Food Fishes of North America"; "The Nature and Economic History of the American Menhaden"; etc. He died in Washington, D. C., Sept. 6, 1896.

Goodeniaceæ (-a'se-ē), an order of corolliflora dicotyledons, closely allied to *Campanulaceæ* and *Lobeliaceæ*. The 200 species, the great part herbs, are mostly natives of the Australian and South African regions. *Goodenia ovata* is a pretty yellow-flowered shrub of Australia. *Scævola Taccada* is a shrub from the pith of which the Malays make a kind of rice paper. The young leaves are eaten as a salad.

Good Friday, the name applied by the Roman Catholic and Anglican Church to the Friday before Easter, sacred as commemorating the crucifixion of our Lord; *paraskeue*, Holy Friday, or Friday in Holy Week, was its general appellation. This day was kept as a day of mourning, of rigid fast, and of special prayer from a very early period. It was one of the two paschal days celebrated by the Christian Church, and in memory of the crucifixion was called by the Greeks *Pascha Staurosimon* or the "Pasch of the Cross." In the Catholic Church the service of this day is very peculiar: instead of the ordinary mass, it consists of what is called the mass of the presanctified, the sacred host not being consecrated on Good Friday, but reserved from the preceding day. Communion is forbidden on Good Friday, except in the case of the celebrant and of sick persons. A wooden clapper is

substituted for the bell at the elevation of the host. The most striking part of the ceremonial is the so-called "adoration of the cross," or, as it was called in the Old English popular vocabulary, "creeping to the cross." The black covering is removed from a large crucifix which is placed before the altar, and the entire congregation, commencing with the celebrant priest and his ministers, approach, and on their knees reverently kiss the figure of our crucified Lord. The very striking office of *Tenebræ* (darkness) is held on Good Friday, as well as on the preceding two days: it consists of the matins and lauds of the following day, and has this peculiarity, that by the close all the lights in the church have been gradually extinguished except one, which for a time (as a symbol of our Lord's death and burial) is hidden at the Epistle corner of the altar.

In the Anglican Church also Good Friday is celebrated with special solemnity: proper psalms are appointed, and one of the three special collects is a prayer for "all Jews, Turks, heretics, and infidels." In some ritualistic churches the *improperia*, or reproaches, adopted from the Roman service, are sung; and Bach's Passion music is frequently heard. In England and Ireland Good Friday is by law a *dies non*, and all business is suspended; but this is not the case in Scotland or the United States. In Scotland the day till recently met with no peculiar attention, except from members of the Episcopal and Roman Catholic communions; but of late years there have been services in some Presbyterian churches in the larger towns.

Good Hope, Cape of, the cape at the S. end of the narrow peninsula running S. from Cape Town, South Africa. The name is a translation of the Portuguese *Cabo da Boa Esperança*, the name given by King John II., of Portugal, because its doubling in 1487 by Bartholomew Diaz, who called it *Cabo Tormentoso*, or Stormy Cape, afforded good hope of the discovery of the long-sought-for sea-way to India.

Goodrich, Charles Augustus, an American clergyman and author, brother of Samuel Goodrich; born in Ridgefield, Conn., in 1790. He was graduated at Yale in 1812. He held the pastorates of Congregational churches in Worcester, Mass., and Berlin and Hartford, Conn. Among his works are: "Lives of the Signers" (1829); "History of the United States" (1852–1855); "Universal Traveler." He died in Hartford, Conn., Jan. 4, 1862.

Goodrich, Frank Boot, pseudonym DICK TINTO, an American author; born in Boston, Mass., Dec. 14, 1826; graduated at Harvard in 1845. His Paris letters to the New York "Times" first brought him into notice. He published: "Court of Napoleon; or, Society Under the First Empire" (1857); "Women of Beauty and Heroism" (1859); "World-Famous Women, From Semiramis to Eugénie" (1870); etc. He died in Morristown, N. J., March 15, 1894.

Goodrich, Samuel Griswold, pseudonym PETER PARLEY, an American author; born in Ridgefield, Conn., Aug. 19, 1793. He edited the "Token," published in Boston from 1828 till 1842. From 1841 till 1854 he edited "Merry's Museum and Parley's Magazine." His "Peter Parley" books won great popularity, evidenced by the fact that the pen-name was attached to more than 70 spurious volumes. Among the 200 volumes published by him are: "The Poetical Works of John Trumbull" (1820); "Tales of Peter Parley About America" (1827); similar books on Europe, Asia, Africa, and other countries. He died in New York city, May 9, 1860.

Goods and Chattels, the legal and popular denomination for personal property as distinguished from things real, or lands, tenements, or hereditaments.

Goodsir, John, a Scottish anatomist; born in Anstruther, Fifeshire, Scotland, March 20, 1814. He studied arts at St. Andrews University, and was next apprenticed to a dentist in Edinburgh, attending the medical classes there the while. In 1840 he became keeper of the Museum of the Royal College of Surgeons in Edinburgh, where he lectured on the diseases of bone and cartilage (1842–1843). His important memoirs on "Secreting Structures" and on the "Human Placenta," and many of his papers in comparative anatomy and natural history, are still of value. In 1846 he was appointed Professor of Anatomy in the University of Edinburgh. He died in Wardie, near Edinburgh, Scotland, March 6, 1867.

Good Templars, Independent Order of, an association organized at Utica, N. Y., in 1851, by Daniel Cady and others; first name Good Templars merely. The Grand Lodge of New York was instituted Aug. 11, 1852, and the order spread into many other States and Canada. No restriction was placed on membership on account of color or sex. It has no beneficiary system. Its platform consists of total abstinence from all intoxicating liquors as a beverage, no license, prohibition of manufacture and sale, and the election of good men to enforce the laws. Its secrecy is guarded by signal raps and passwords. The motto of the order is "Faith, Hope, and Charity." It is an outgrowth of the Sons of Temperance.

Goodwill. (1) The custom of any trade or business; (2) the influence of the seller of any business to secure his successor the custom already existing; (3) the right or title to keep up and continue the business

purchased from an outgoing tenant; (4) the money paid for such right or title.

Goodwin, Mrs. Maud Wilder, an American historical novelist; born in New York State in 1856. She was a resident of New York city. Among her works are: "The Colonial Cavalier"; "The Head of a Hundred"; "White Aprons: An Historical Romance"; "Dolly Madison," a biography; "Historic New York" (1898); etc.

Goodwin, William Watson, an American educator; born in Concord, Mass., May 9, 1831; was graduated at Harvard College in 1851; Professor of Greek Literature in Harvard in 1860–1901. He is the author of "Syntax of the Moods and Tenses of the Greek Verb"; "Greek Grammar"; etc.

Goodwin Sands, dangerous sand-banks in the Strait of Dover, off the S. E. coast of Kent, England. The roadstead termed the Downs lies between them and the mainland. Length, about 10 miles.

Goodyear, Charles, an American inventor; born in New Haven, Conn., Dec. 29, 1800. He failed as an iron manufacturer in 1830, but in 1834 turned his attention to india-rubber, the manufactured products of which had hitherto proved failures because of their liability to soften in the heat of summer. Amid poverty and ridicule, sometimes in prison for debt, he patiently pursued the experiments which, after he had obtained a fresh idea from his assistant Hayward's use of sulphur, ended, in 1844, in the issue of his patent for vulcanized rubber. This process he afterward perfected, discovering new uses to which his product could be applied, till it required 60 patents to secure his inventions. He received medals at London (1851) and Paris (1855), as well as the cross of the Legion of Honor; though kept in continual litigation and consequent poverty by shameless infringements of his rights, he yet lived to see his material applied to nearly 500 uses, and to give employment, in England, France, Germany, and the United States, to 60,000 persons. He died in New York city July 1, 1860.

Goodwood, a country-seat of the Duke of Richmond and Gordon, near Chichester, Sussex, England. It is the location of a celebrated race course where races are run every year in July, the principal one being that for the Goodwood cup.

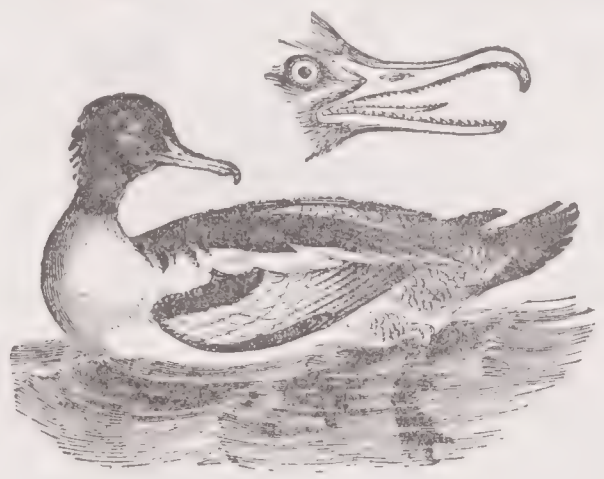
Gookin, Daniel, an American colonial official; born in Kent, England, about 1612; went with his father to Virginia in 1621; removed to Cambridge, Mass., to enjoy closer relations with the Puritans, in 1644; and there entered both military and political life. He became Speaker of the House in 1651, a magistrate in 1652, and superintendent of the Indians in Massachusetts in 1656. Co-operating with John Eliot, he opposed repressive measures against the Indians. He visited England in 1656 and 1660; aided in protecting the regicides Goffe and Whalley; and became major-general of the colony in 1681. His "Historical Collections of the Indians of Massachusetts" was published in 1792; his "History of New England" was lost in manuscript. He died March 19, 1687.

Goomty, or **Goomtee,** a river of Hindustan, rising in a morass and entering the Ganges 16 miles below Benares, after a course of 480 miles. There are so many of the dead thrown into it, that its waters may be accounted unfit for use otherwise than for the purpose of navigation and irrigation.

Goonass Pass, a pass in Bussahir, across the S. range of the Himalaya, 16,000 feet above the sea.

Goorkhas. See GHURKAS.

Goosander, a web-footed bird in the duck family (*Anatidæ*), in the same genus as the mergansers, of which it is the largest



GOOSANDER.

British representative. The adult male, which measures 26 inches in length, has the head and upper part of the neck of a rich shining green, the feathers of the crown and back of the head elongated, the back black and gray, the wings black and white, the breast and belly of a delicate reddish-buff color. The bill, legs, and feet are orange-red. The female, which is rather smaller, has the head reddish-brown, with a less decided tuft than the male, and much grayer plumage. The goosander is a native of the Arctic regions, extending into the temperate parts of Europe, Asia, and America. It usually nests under a ledge of rock, in the hollow trunk of a tree, or under the shelter of the twisted roots, and lays, about the end of April, 8 to 13 creamy-white eggs. It feeds almost entirely on living fish. The flesh of the goosander is extremely rank and coarse.

Goose, a tailor's smoothing and pressing iron, from the handle being like the neck of a goose. Also a game of chance

played on a card divided into small compartments, numbered from 1 to 62, and arranged in a spiral form round an open central space. It was played by two or more persons, who moved their counters over the compartments according to the numbers which they threw on dice. The name was derived from the figure of a goose being depicted on every 4th and 5th compartment in succession; if the throw of the dice carried the counter of the player on to a goose he was entitled to move forward double the actual number thrown. In ornithology; any bird of the genus *Anser*. The domestic goose is believed to have descended from *Anser ferus*, called in books the greylag goose. It is valued for the table and on account of its quills and fine soft feathers. Geese = *Anserinæ*, a sub-family of *Anatidæ* (ducks). The body is large and heavy, the neck long, the head small, and the bill conical, the wings long and powerful, the feet

WILD GOOSE.

somewhat long, with small toes. In summer they inhabit the polar regions, migrating S. in flocks on the approach of winter. The nest, which is of coarse grass, and situated in marshy places, is large; the eggs several.

Gooseberry, the fruit of *Ribes grossularia*, also the bush itself. The fruit is a succulent berry, very wholesome and agreeable, of various colors — whitish, yellow, green, and red. The gooseberry is a popular fruit for preserving, and is extensively cultivated, being of very easy culture. It may be raised from slips, which is the usual mode of perpetuating varieties; new varieties are raised from seed. The plant of four years old produces the largest and finest fruit; afterward the fruit becomes smaller but increases in quantity. *R. niveum*, an American species, has fine white flowers and is cultivated as an ornamental shrub. Sir Joseph Hooker places *R. grossularia* under a first section *Grossularia*, of the genus *Ribes*, with the character branches spinous; leaves plaited in bud; peduncles 1 to 3 flowered. There are two varieties of the wild gooseberry, *R. grossularia* proper, with the leaves thinning above, and the fruit glandular hairy; and *R. Uva crispa*, with the leaves smaller and the ripe fruit glabrous.

Gooseberry Caterpillar, a name applied to the larvæ of two very different insects, both injurious to gooseberry and currant bushes. (1) The magpie moth (*Abraxas grossulariata*), appearing about midsummer, has usually a black head, yellow body, and white wings spotted black. From eggs laid on the leaves of the above-mentioned bushes caterpillars hatch in September, feed for a brief space, and then hide themselves till May or June of the next year. The caterpillar is a "looper," drawing itself up into a peculiar curve when alarmed, and has a black head, creamy body with some stripes of reddish-orange along the side and elsewhere, and with a row of black spots along the middle line of the back. After a period of voracity it spins a transparent cocoon and passes into a chrysalis, yellow at first, but afterward shining black, with orange-colored rings. Care of the bushes, syringing with various washes, and gathering the torpid caterpillars are the usual means of prevention and remedy. (2) More destructive than the above is the larva of the gooseberry sawfly (*Nematus ribesii*), which plays havoc with the leave of bushes. The female sawfly appears about April and lays her eggs on the leaves. The grubs hatch in a week or less, and eat small round holes first in the leaf on which they are born, then all over the bush. The adult fly is a yellowish insect with transparent wings, and measures about one-third of an inch in length. The larva is bluish-green, with black head, feet, tail, and spots, with 20 feet, and a length of about three-quarters of an inch when full grown. At maturity they drop from the bushes, and bury themselves in the ground to undergo their metamorphoses. The grubs of late summer broods remain as such, but within cocoons, throughout winter, finishing their metamorphoses as the gooseberry bushes are becoming leafy in the spring. Removing the surface soil in early spring from under the bushes, treatment with lime, picking off attacked leaves, drenching the bush with warm water not hot enough to hurt the leaves, dusting with flour of sulphur, etc., is recommended. Dusting with hellebore powder is dangerous to those who may eat the berries from which the poison has not been removed.

Goosefish, a common name in the United States for the ANGLER FISH (*q. v.*). The American goosefish (*Lophius americanus*) is one of the best known of the five

species of Lophius, grows to a length of 4 to 5 feet, and weighs from 15 to 170 pounds. It is dark brown above and dirty white below, is hideous in appearance (being also known as "wide gab" and "devilfish"), and has a most voracious appetite, preying indifferently on all kinds of fish, and eating occasionally fowls, such as gulls and ducks. It is practically useless for any purpose.

Goosefoot, a genus of plants, natural order *Chenopodiaceæ* indigenous to the temperate parts of the E. continent. They are weedy plants common in waste places, and bear small greenish flowers, which are sessile in small clusters, collected in spiked panicles. *C. botrys*, the oak of Jerusalem, is found in sandy fields from New England to Illinois. The seeds of *C. quinoa* of Peru are used as food.

Goose Step, the act of a recruit in balancing himself on one foot while moving the other backward and forward without taking a step.

Gopher, a name given by the early French settlers in the United States to various animals which honeycomb the

GOPHER.

ground by burrowing in it. In Canada and Illinois it was given to a gray burrowing squirrel, *Spermophilus Franklini*, W. of the Mississippi to *S. Richardsonii*, in Wisconsin to a striped squirrel, and in Missouri to a burrowing pouched rat, *Geomys bursarius*. All these are mammals; but in Georgia the term was applied to a snake, *Coluber couper*, and in Florida to a turtle, *Testudo polyphemus*.

Gopher Wood, the wood of which Noah's ark was directed to be made. Various attempts have been made to identify the tree. The most probable view is that it was the cypress. See CYPRESS.

Gopher State, a name sometimes given to Minnesota.

Gopya, nymphs and muses of Indian mythology.

Gorakhpur (go-ruk-pör′), capital of a district in the United Provinces of India, on the Rapti, 430 miles N. W. of Calcutta, with an active trade in grain and timber. Pop. (1901) 64,148. District, area 4,598 square miles; pop. exceeds 2,617,000, nine-tenths Hindus.

Goral, *Nemorhœdus goral*, an antelope found in the Himalaya Mountains. It is about the size of the common goat, has black horns about 4½ inches long, the general color of the body mouse-gray.

Gordian Knot, a knot tied by GORDIUS (*q. v.*) in the rope which bound the yoke of his chariot to the draught tree in such an artful manner that the ends of the cord could not be perceived. So intricate was it that the report went abroad that the empire of Asia was promised by the oracle to him who could untie it. Alexander the Great, wishing to inspire his soldiers with courage and his enemies with the belief that he was born to conquer Asia, cut the knot with his sword, and so claimed to have fulfilled the oracle. Hence the term "gordian knot" is used for any apparently inextricable difficulty or deadlock; and to "cut the gordian knot" is equivalent to removing or solving a difficulty by bold or unusual measures.

Gordianus (ī-ā′nus) **I., Marcus Antonius,** surnamed Africanus; Roman emperor; born about 158 A. D. He was descended by the father's side from the famous family of the Gracchi. After being ædile, he twice filled the office of consul. He was then appointed pro-consul of Africa. The tyranny and injustice of the Emperor Maximinus at length excited a rebellion in Africa, the authors of which proclaimed Gordianus emperor, though he was then (238) in his 80th year. At the same time his son was conjoined with him in the exercise of imperial authority. The younger Gordianus, however, was defeated and slain in battle by Capellianus, viceroy of Mauritania, before Carthage, whereupon, his father put an end to his own existence (having been emperor for little more than a month) in 238.

Gordianus II., Marcus Antonius, Roman emperor, son and associate of the preceding; born in 192 A. D. He died near Carthage, Africa, in 238.

Gordianus III., Marcus Antonius Pius, Roman emperor, grandson of Gordianus I.; born about 224 A. D. He was raised to the dignity of Cæsar with Pupienus and Balbinus, who were also elected emperors in opposition to Maximinus; and, in the same year (238), after the three last named had fallen by the hands of their own soldiers, Gordianus was elevated by the Prætorian bands to the rank of Augustus. Assisted by his father-in-law, Misitheus, whom he made prefect of the Prætorians, Gordianus marched in 242 into Asia, against the Persians, who under Shahpûr (Sapor) had taken possession of Mesopotamia and had advanced into Syria. He relieved Antioch, which was threatened by them; drove back the Persians beyond the Euphrates; and was just about to march

into their country, when Misitheus died. Philip the Arabian, who succeeded Misitheus, stirred up the soldiery to assassinate the emperor in 244.

Gordius, in Greek legend, a Phrygian peasant, father of Midas, who was raised to the Phrygian throne in accordance with an oracle which declared to its Phrygian consulters that their seditions would cease if they elected as king the first man they met, mounted on a chariot, going to the temple of Zeus. This was Gordius, who, to evince his gratitude, consecrated his chariot to Zeus, and fastened the pole with an ingenious knot. See GORDIAN KNOT.

Gordon, Family of, a celebrated Scottish historical house, the origin of which is still wrapped in a certain measure of obscurity. It is probable that the family came over to England with William the Conqueror. The earls of Sutherland, the barons of Lochinvar, the viscounts of Kenmure, and the earls of Aberdeen are all branches of the Gordon family. The title of Duke of Gordon became extinct in 1836, but was revived in 1875.

Gordon, Adam Lindsay, an Australian poet; born in Fayal, Azores, in 1833. He was the son of a retired army captain. At 20 he sailed to Adelaide to push his fortune, and tried in turns, but without success, sheep farming, "over-landing," and cattle-driving in South Australia, emerging to light in Melbourne as the best gentleman steeplechase rider in the colony. He wrote "Sea-spray and Smoke-drift" (1867); "Ashtaroth, a Dramatic Lyric" (1867); "Bush Ballads and Galloping Rhymes" (1870); "How We Beat the Favorite" is said to be the most popular poem in Australia, and certainly it is the best ballad of the turf in the English tongue. Impelled by natural gloom, broken fortunes, and religious hopelessness, he committed suicide in New Brighton, Australia, June 24, 1870.

Gordon, Archibald D., an American dramatist; born in Ceylon, Oct. 11, 1848. He entered a publishing house in New York city in 1865, and subsequently became connected with New York and Chicago papers as dramatic critic. His works include "Trixie"; "The Ugly Duckling"; "Is Marriage a Failure?"; "That Girl From Mexico." He died in Port Richmond, Staten Island, N. Y., Jan. 9, 1895.

Gordon, Armistead Churchill, an American poet; born in Albemarle co., Va., Dec. 20, 1855. After graduating from the University of Virginia he became a lawyer in Staunton, Va. In collaboration with Thomas Nelson Page he wrote a volume of verse entitled "Befo' de War" (1888); also "Congressional Currency," "For Truth and Freedom" (1898); etc.

Gordon, Charles George, called "Chinese Gordon" and "Gordon Pasha," an English soldier; born in Woolwich, England, Jan. 28, 1833. He entered the Royal Engineers in 1852, and served in the Crimea (1854–1856). The Taeping rebellion in China he completely crushed by means of a specially trained corps of Chinese, exhibiting marvelous feats of skilled soldiership. On his return to England with the rank of colonel he was appointed chief engineer officer at Gravesend. From 1874 to 1879 he was governor of the Sudan under the khedive. For a few months in 1882 he held an appointment at the Cape, and had just accepted a mission to the Kongo from the King of the Belgians, when he was sent to withdraw the garrisons shut up in the Sudan by the insurgent mahdi. He was shut up in Khartum by the rebels, and gallantly held that town for a whole year. A British expeditionary force under Lord Wolesley was dispatched for his relief; an advance corps of which sighted Khartum Jan. 24, 1885, to find that the town had been treacherously betrayed into the hands of the mahdi two days before, and Gordon murdered. His character was marked by strong religious feelings, which latterly became so intensified as to make him somewhat of a religious enthusiast and fatalist.

Gordon, Charles William, a Canadian author; born in Indian Lands, Glengarry, Ont., Canada, in 1860. He was graduated at Toronto University in 1883 and at Knox College in 1887; was a missionary to Banff, etc., Rocky Mountains, 1890–1894. He wrote "Beyond the Marshes"; "Black Rock"; "Gwen's Cañon"; "The Sky Pilot"; "Ould Michael"; "The Man from Glengarry." Pen name, Ralph Connor.

JOHN B. GORDON.

Gordon, John Brown, an American military officer; born in Upson co., Ga., Feb. 6, 1832; was graduated at the University of Georgia; admitted to the bar and

began practice. When the Civil War broke out he was appointed a captain of infantry in the Confederate army; served with marked distinction throughout the war, during which he was wounded eight times; was promoted Brigadier-General in April, 1863, and later Major-General. In 1873 he was elected to the United States Senate and served in that body till 1880 and in 1891–1897. In 1887–1890 he was governor of Georgia. On May 31, 1900, he was chosen commander-in-chief of the United Confederate Veterans. General Gordon was widely known as an orator on events of the Civil War. He died Jan. 9, 1904.

Gordon, Sir John Watson, a Scottish portrait-painter, son of Captain Watson of the British navy; born in Edinburgh, Scotland, in 1788. On Sir Henry Raeburn's death in 1823, he stepped into his place as the first portrait painter of Scotland. Three years later he took the surname of Gordon; in 1850 he was elected president of the Royal Scottish Academy and knighted, and in 1851 he became a London Royal Academician. Nearly every man of note in Scotland, besides not a few in England, sat to him for their portraits. Among his best-known works were "Sir Walter Scott," "Dr. Chalmers," "Earl of Dalhousie," "Sir Alexander Hope," "Lord President Hope," "Sir John Shaw Lefevre," and "the Provost of Peterhead." The last picture gained the gold medal at the French Exhibition of 1855. He died in Edinburgh, June 1, 1864.

Gordon, Joseph Claybaugh, an American educator; born in Piqua, O., March 9, 1842; was graduated at Monmouth College, Ill., in 1866. He was the first instructor in oral education for the deaf in the United States; organizing the oral department in the Indiana Institution for the Deaf in 1869; was Professor of Mathematics and Chemistry in Gallaudet College, Washington, in 1873–1897; then became superintendent of the Illinois Institution for the Education of the Deaf. He was author of "Education of Deaf Children"; "Notes and Observations on the Education of the Deaf"; etc. He died in 1903.

Gordon, Lady Duff, an English writer, the only child of John Austin, the jurist; born in London, England, June 24, 1821. In 1826 she went with her parents to Germany, whence, after two years' stay, she returned, speaking German like her native language. At Boulogne in 1834 she met Heine, an acquaintance renewed 20 years later, when Heine was dying in Paris. In 1840 she married Sir Alexander Duff Gordon. In 1842 she published the first of her long series of translations from the German, Niebuhr's "Gods and Heroes of Greece." This was followed by the "Amber Witch," "French in Algiers" (1845); Feuerbach's "Remarkable Criminal Trials" (1846); Ranke's "House of Brandenburg" (1849, with her husband); Ranke's "Ferdinand and Maximilian" (1850, with her husband); etc. She wrote also "Letters from the Cape" (1861–1862); "Letters from Egypt" (1863); "Last Letters from Egypt" (1865). She died in Cairo, Egypt, July 14, 1869.

Gordon Bennett, Mount (named from James Gordon Bennett), a mountain seen in Africa by Stanley in 1875. It lies S. of Albert Nyanza, a little N. of the equator and E. of lon. 30° E. It is a truncated cone, probably an extinct crater, and rises 14,000 or 15,000 feet in height. It is sometimes covered with snow.

Gordon, Julien. See CRUGER.

Gordon-Cumming, Constance Frederica, an English traveler and writer, sister of the famous sportsman Roualeyn Gordon-Cumming; born in Altyre, Morayshire, Scotland, May 26, 1837. She traveled extensively in Great Britain in her early years, and later passed her time in Oriental countries. Among her works are: "In the Hebrides"; "Via Cornwall to Egypt"; "In the Himalayas"; "At Home in Fiji"; "A Lady's Cruise in a French Man-of-War"; "Two Happy Years in Ceylon"; "Work for the Blind in China."

Gordonia, a genus of *Ternstrœmiaceæ*. *G. Lasianthus,* the loblolly bay, which covers considerable tracts of swampy coast in the Gulf of Mexico, is a handsome tree (50 to 60 feet), with evergreen leaves, and large white fragrant flowers. The bark is used in tanning.

Gore, a triangular or wedge-shaped piece; as (1) a triangular piece sewed into a dress, a sail, etc., to widen it out at any part, a gusset; (2) an angular piece of planking used in fitting the skin of a vessel to the frames; (3) a triangular or pointed piece of land. In heraldry, a charge consisting of two curved lines, one from the sinister chief point, the other from the base middle point, meeting in an acute angle in the middle of the fesse point.

Gore, Catherine Grace Moody, an English novelist; born in East Retford, Nottinghamshire, England, in 1799. In 1823 she married Capt. Charles Arthur Gore, with whom she resided for many years on the Continent, supporting her family by her literary labors. She wrote over 70 works, including "Theresa Marchmont" (1823); "Cecil, or the Adventures of a Coxcomb" (1841); "Ormington" (1842); "The Ambassador's Wife"; "The Banker's Wife"; etc. The chief feature of her novels is the caustic pictures of fashionable society. She died in Lynwood, Hants, England, Jan. 29, 1861.

Gore, Charles, an English clergyman and author; born in 1853. He was a Fel-

low of Trinity College, Oxford, and vicar of Radley, near Oxford, and became bishop of Birmingham in 1905. He was the editor of "Lux Mundi," and author of the essay on "The Holy Spirit and Inspiration" in that volume. He also wrote: "The Church and the Ministry"; the Bampton lecture for 1891 on "The Incarnation of the Son of God"; and "Roman Catholic Claims" (1888); "Good Citizenship" (1899).

Gorée (gō-rā′), a small island in French Senegal, lying immediately S. of Cape Verd. It is almost entirely covered by the town of Gorée, an unhealthy place, whose commercial importance is rapidly being transferred to the port of Dakar, which lies over against it on the mainland.

Gorged, in heraldry, encircled round the throat; as when an animal is represented bearing a crown or the like round the neck. It is blazoned as gorged with a crown, etc.

Görgei, or Görgey, Arthur (ger′ge-i), a Hungarian general; born in Toporcz, county of Zips, Hungary, Jan. 30, 1818. After completing his studies at the military school at Tuln, he was appointed to a commission in the Hungarian body-guard at Vienna, which service he abandoned to study chemistry at Prague. The news of the insurrection in Hungary (1848) called him back to military duties, and hastening to Budapest, he placed his sword at the disposal of the Hungarian ministry. After the battle of Schwechat, he assumed the chief command of the Hungarian army, and in that position showed great military talents. Differences, however, arose between himself and the civil authorities; twice he was superseded in his command, and on resuming it was alternately victor and vanquished. On the resignation of the governor and council, Aug. 11, 1849, Kossuth made him dictator in his place. Shortly after this, the Hungarian forces laid down their arms. For this Geörgei has been branded as a traitor, though the state of affairs seemed desperate enough to warrant submission. He went to Klagenfurt, was afterward allowed to leave on parole, and pursued his favorite study of chemistry at Pest. He wrote "My Life and Acts in Hungary" (1851).

Gorges, Sir Ferdinando, styled "the father of colonization in America"; born in Ashton, Somersetshire, England, about 1565. He founded two Plymouth companies (1606–1620 and 1620–1635) for acquiring and planting lands in New England, and in 1639 received from the king a charter constituting him proprietor of Maine. He adhered to the king in the civil war, and died in 1647. His son neglected the province, which finally placed itself under the jurisdiction of Massachusetts, to which colony Sir Ferdinando's grandson sold his rights in 1677 for £1,250.

Gorget, a metal covering for the throat, worn by an armed man, to protect the juncture between the helmet and the breast-plate; also a kind of breast-plate like a half-moon. The camail or throat covering of chain mail is sometimes called the gorget of mail. In dress, a kind of ruff formerly worn by females. In military science, a small, crescent-shaped, metallic ornament worn on the breast by officers on duty. The gorget was the last remnant of body armor worn by infantry in England. In surgery: (1) a lithotomic cutting-instrument. (2) A canulated or concave conductor used in operation for fistula; called also a blunt gorget.

Gorgias, a celebrated Greek rhetorician and sophist, of the time of Socrates; born in Leontini, Sicily, about 485 B. C. He came to Athens as ambassador from his native city in 427 B. C., subsequently settled in Greece, and, becoming famous as a teacher of eloquence, traveled from place to place, acquiring wealth as well as fame. Plato's dialogue "Gorgias" is written against him. Of a large work by him on 'Nature" nothing remains. Two works attributed to him are extant, the "Apology of Palamedes," and the "Encomium on Helena." He died in Larissa, Thessaly, about 380 B. C.

Gorgon, in Greek mythology, one of the three sisters, daughters of Phorcys and Ceto. Their names were Stheno, Euryale, and Medusa, all of whom were immortal except Medusa. According to the mythologists, their hair was entwined with serpents, their hands were brass; their body was covered with impenetrable scales, and their teeth were as long as the tusks of a wild boar. They were so frightful that they turned to stone all those on whom they fixed their eyes. They were conquered by Perseus, who, it is said, was furnished by different deities with weapons which he afterward returned to them. The head of Medusa remained in his hands; and after he had finished all his laborious expeditions he gave it to Minerva, who placed it on her ægis, with which she turned into stone all such as fixed their eyes upon it. It is said that, after the conquest of the Gorgons, Perseus took his flight in the air toward Ethiopia, and that the drops of

A GORGON.

blood which fell to the ground from Medusa's head were changed into serpents, which have ever since infested the sandy deserts of Libya.

Gorilla, a celebrated anthropoid ape, generally believed to come nearer than any known one to man, though some contend that the affinity of the gibbon (*q. v.*) is closer. The number of teeth in the gorilla, and all the old world monkeys, except the lemurs, is 32, the same as in man. The hand has the same bones as in man. Professor Huxley considers Cuvier's order *Quadrumana* (four-handed) inaccurate, maintaining that the hinder extremities of all the monkeys and lemurs are framed anatomically as feet and not hands. The height is about 5 feet, almost the same as man. On the other hand, the greatest capacity of the gorilla's brain is only 34½ cubic inches, the least

FEMALE GORILLA.

23, against 62 in the least capacious human skull, and 114 in the greatest. The formidable canines, so conspicuous in the specimens in the Natural History Department of the British Museum, look very brutal, but they are only sexual characteristics, being of more moderate size in the female. The low facial angle also, and the abundant hair, with the extraordinary breadth of the chest, diminish the resemblance. The last-mentioned characteristic imparts to the animal colossal strength, which it is said to use in its native haunts against man. It is a native of Lower Guinea and the interior of equinoctial Africa. It has a congener in the same region, the chimpanzee (*q. v.*).

Gorky, Maxim ("Maxim the bitter"), pseudonym of Alexei Maximovitch Pyeshkov, a Russian novelist; born in Nijni-Novgorod, March 14, 1868. After successive trials at many occupations, such as painter of ikons, peddler of kvass, scullery-boy, gardener, baker's apprentice, and lawyer's clerk, he set out tramping over Russia, and the scenes and persons of his vagabond life furnished material for literary work. His first story, "Makar Chudra," appeared in 1892, in a native newspaper. Other sketches followed, but his success as a writer began with "Chelkash" in 1894. From that time he wrote numerous tales, novels, and plays which have been translated into various languages. Among these the most admired have been the stories "The Orloff Couple," "Twenty-six and One," "Foma Gordyeev," "The Outcasts," and the plays "The Night Refuge" and "The Children of the Sun." In 1907 appeared his novel "Mother." Gorky was a prominent leader in the Russian revolutionary movement, and in January, 1905, he was arrested at Riga and imprisoned, but was soon released. After his release he traveled to regain health, and in April, 1906, visited the United States, toured the country, and lectured for the revolutionary cause in Russia.

Görlitz (ger'lits), a town of Prussian Silesia, on the left bank of the Neisse, 49 miles W. of Liegnitz. Among its beautiful Gothic churches is that of St. Peter and St. Paul (1423-1497). Outside the town is the Kreuzkapelle (1481-1489), an imitation of the Holy Sepulcher at Jerusalem. A railway viaduct, upward of 2,720 feet in length and 118 feet high, here crosses the valley of the Neisse. Görlitz has manufactures of cloth, its staple, cotton, linen, and fictile wares, with iron foundries and machine shops. Pop. (1905) 83,766.

Gorman, Arthur Pue, an American politician; born in Howard co., Md., March 11, 1839. At 13 he became a page in the United States Senate, and from 1860 to 1866 he was postmaster of that body. In the latter year he was appointed internal revenue collector of the Fifth District of Maryland. In 1869 he was elected a member of the Maryland House of Delegates, of which he was Speaker in 1873-75. He was State senator from 1875 to 1881, and United States senator from 1881 to 1899. After three years of private life, in 1902 he was again elected to the Senate. He led in the opposition to the Force Bill of 1889, and assisted in modifying the Wilson Tariff Bill in 1894. At times he exerted a commanding influence in the Democratic party, and he was regarded as one of the keenest politicians of his generation. He died June 4, 1906.

Görner, Karl August (ger'ner), a German playwright; born in Berlin, Jan. 29, 1806. He ran away from home when a lad in order to become an actor; eventually had

a company of his own; and wrote over 100 successful plays, beginning with "The Gardener and His Wife." "Niece and Aunt"; "Black Peter"; "A Happy Paterfamilias"; and "The Ennobled Shopkeeper," are some of the others. He died in Hamburg, April 9, 1884.

Gorostiza y Cepeda, Don Manuel Eduardo de (gôr-ôs-tē'thä ē thā-pā'THä), a Mexican diplomatist; born in Vera Cruz, Nov. 13, 1791. His father was Spanish governor of Mexico. At 25 he had made theater-goers of Madrid familiar with his name, but his connection with schemes of Mexican independence interfered with his literary career. He was made Mexican minister to England when independence was secured, and later had himself transferred to Paris, in which city he achieved his most enduring renown as a writer of plays. He published: "Bread and an Onion, with Thee, Love," the source of Scribe's "A Cottage and its Heart"; "Allowance for All"; "Such as It Is." He died in Tacubaya, Oct. 23, 1851.

Görres, Jakob Joseph von (ger'res), a German author; born in Coblenz, Prussia, Jan. 25, 1776. He threw himself eagerly into the movement of the French Revolution; and a journal established by him, "The Red Sheet," advanced the most extreme opinions of the time. In 1799 he went to Paris as the chief of a deputation to negotiate the annexation of the Rhineland to the French Republic, but in Paris became convinced of Napoleon's despotism. On his return to Germany he settled down as a lecturer on physics in his native town, and devoted himself exclusively to literature for several years. In 1807 he published the first part of his well-known collection of German "National Books"; and in 1810 his work on Asiatic mythology. From these studies he was aroused to the hope of liberation from French tyranny by the reverses of the French arms in the Russian expedition. Appealing to the national sentiment of his countrymen in the "Rhine Mercury," he became the literary center of the national movement. After the reestablishment of German independence he denounced the encroachments of domestic absolutism with the same energy, till he was obliged to flee to France, and afterward to Switzerland. In 1827 he accepted the professorship of the History of Literature in the university just founded at Munich by King Louis of Bavaria. His later years were devoted to literature, and to the controversies as to mixed marriages and Hermesianism (see HERMES). His chief work was "Christian Mystics" (1842; new edition 1879). He died in Munich, Jan. 29, 1848.

Gorringe, Henry H., an American naval officer; born of English parents in Barbadoes, W. I., Aug. 11, 1841; settled in the United States early in life; joined the Union navy in 1862, and served with the Mississippi squadron under Porter, taking a conspicuous part in nearly all of the important actions of that squadron; and was promoted lieutenant-commander in July, 1865. He is best remembered by his removal of the Egyptian obelisk (Cleopatra's Needle), which the khedive had presented to the United States, from Egypt to New York city, in the iron vessel "Dessoug." The total cost of transportation was $100,000, which was paid by the late William H. Vanderbilt. The obelisk arrived in New York harbor July 20, 1880, and was erected in Central Park, Jan. 23, 1881. Gorringe was the author of a "History of Egyptian Obelisks." He died in New York city, July 6, 1885.

Gortchakoff, Prince Alexander Michaelovitch (gor-chä-kof'), a Russian statesman; born in St. Petersburg, July 16, 1798. He was the son of Prince Michael, a distinguished officer; was educated at the Lyceum of Tzarskoe-Selo, and acquired experience in diplomacy under Nesselrode. Ambassador at Vienna (1854-1856), he displayed great judgment and ability during the Crimean war. He succeeded Nesselrode as minister for foreign affairs in 1856. When France became hostile to Austria on the Italian question, he cultivated the friendship of the former. Desirous of restoring the prestige of Russia in European affairs, he addressed a circular dispatch to the Powers in 1860 in favor of the principle of nationalities in the Two Sicilies. He also favored the French expedition of 1861 to Syria on behalf of the oppressed Christians, but he declined to associate himself with France and Great Britain in their unfriendly attitude toward the United States after the outbreak of the Civil War. He was appointed chancellor in July, 1863. From this time till the ascendancy of Bismarck he was the most powerful minister in Europe. He remained neutral during the struggle between Prussia and Austria; and, owing to a definite understanding between the Russian and Prussian chancellors, the neutrality of Austria was secured in the great Franco-Prussian war of 1870. After the conclusion of the Turko-Russian war, the repudiation of the treaty of San Stefano, and the signing of the treaty of Berlin, his influence began to wane. He was superseded by M. de Giers as minister for foreign affairs in March, 1882. After his retirement he left Russia for Baden-Baden, where he died March 1, 1883.

Gortchakoff, Prince Michael, a Russian general, cousin of the preceding; born in 1795. He served against the French in 1812-1814, and against the Turks in 1828-1829. In the war of the Polish revolution of 1831 he greatly distinguished himself,

and was made general of artillery He was appointed military governor of Warsaw in 1846, and took part in the invasion of Hungary in 1849. On the outbreak of the Crimean War he twice commanded the Russian army dispatched to the Danubian principalities, on the second occasion leading the retreating Russian forces into Bessarabia after the raising of the siege of Silistria. In 1855 he was appointed commander-in-chief in the Crimea and Southern Russia. He was defeated on the Tchernaya, but recovered his laurels by his gallant defense of Sebastopol, and by his skillful retreat to the North Fort after the blowing up of the fortress. Alexander II. appointed him governor of Poland in 1856, and he was engaged in carrying out the conciliatory policy of the czar when his death occurred in Warsaw, May 30, 1861.

Görz (gerts), capital of the Austrian crownland of Görz-Gradisca, in a fruitful plain, near the Isonzo, 35 miles N. N. W. of Trieste. Shut in by mountains on all sides except the S., it enjoys an almost Italian climate, and has of late years acquired some fame as a health resort. Among its principal buildings are the old castle of the former Counts of Görz and the former Jesuit college, both now used as barracks; the cathedral, with a beautiful sacristy; the prince-bishop's palace, etc. The surrounding plain is covered with vineyards; industries, the cultivation and export of fruit and wine. Görz's specialty has long been the printing of Hebrew books for the East. In a Franciscan cloister close by are the graves of Charles X. of France, the Duc d'Angoulême and his wife, and the Comte de Chambord. Pop. (1900) 25,432.

Goschen, George Joachim (gō′shen), an English statesman; born in London, England, Aug. 10, 1331. He was educated at Rugby and Oriel College, Oxford. In 1863 he entered Parliament as a Liberal for the city of London. When Lord Russell, after Palmerston's death, reorganized the Liberal ministry, he appointed Goschen vice-president of the Board of Trade, in November, 1865. In the following January the latter entered the cabinet in consequence of his appointment as chancellor of the Duchy of Lancaster. When Gladstone became prime minister in 1868, Goschen took office as president of the poor-law board, but three years later became the head of the admiralty, which post he retained till the fall of the Gladstone ministry in 1874. His next public work was the regulation, in conjunction with Joubert, of the Egyptian finances (1876). In 1878 he represented Great Britain at the International Monetary Conference held at Paris, and two years afterward, as ambassador extraordinary to the Porte, enforced on Turkey the fulfilment toward Greece of the treaty of Berlin. He strenuously opposed home rule; in 1887-1892 was Unionist Chancellor of the Exchequer; and in 1895-1896, as First Lord of the Admiralty, he made provision for increasing the navy. He was raised to the peerage as Viscount Goschen in 1900, and in the tariff reform agitation of 1903-1905 was a conspicuous free trader. He published "Foreign Exchanges," addresses, pamphlets, books on education, etc.; and was Lord Rector of Aberdeen and Edinburgh Universities. He died Feb. 8, 1907.

Goshawk, or **Goshauk** (properly goose-hawk), *Astur palumbarius*, a bird of prey. It is brown above, white underneath, barred across with brown, with five browner bands on the tail; the eyelids whitish. When immature it has dots instead of bars. The

GOSHAWK.

female is 24 or 25 inches long, the male almost one-third less. It is abundant in parts of the European continent. It occurs also in this country, in the N. of Africa, in India, etc. It can be used, as it often is in the East Indies, for falconry. It pursues its prey directly, instead of swooping down on it from above like a falcon.

Goshen, that part of ancient Egypt which Pharoah presented to the kindred of Joseph when they came to sojourn in that country. It appears to have lain between the E. delta of the Nile and the Isthmus of Suez, as far S. as the modern Ismailia. The district is generally supposed to have lain round about the Egyptian Kesem (Goshen is Gesem in the Septuagint), a name preserved in the classical Phacusa (Pa-Kesem), now Fakoos, about 45 miles S. of Damietta. The Land of Goshen was

the name given to a part of the Barolong country in Bechuanaland, South Africa, which became in 1884 the seat of a Boer republic. It was, along with the rest of Bechuanaland, declared to be under British protection in September, 1885.

Goshen, a city and county-seat of Elkhart co., Ind.; on the Elkhart river and the Lake Shore and Michigan Southern, and the Cleveland, Cincinnati, Chicago and St. Louis railroads; 25 miles S. E. of South Bend. It manufactures wool, furniture, iron, flour, and farming implements; has a court house, high school, several churches, a National bank, daily and weekly newspapers, and an assessed property valuation of over $3,000,000. Pop. (1890) 6,033; (1900) 9,152; (1910) 8,514.

Goshen, a village and county-seat of Orange co., N. Y., on the Erie, the Lehigh, and the New England railroads; 59 miles N. W. of New York. It carries on a large trade in cheese and butter, which are widely celebrated for their excellence. It contains a court house, waterworks, churches, 2 National banks, and several weekly newspapers. Pop. (1900) 2,826; (1910) 3,081.

Goslar (gos'lär), an ancient town of Hanover, on the N. slope of the Harz Mountains, 27 miles S. E. of Hildesheim. It was at one time a free imperial city, and the residence of the emperors; has several noteworthy old buildings, as the tower called the "Zwinger," with walls 23 feet thick, the late Romanesque Church Neuwerk, of the 12th century, and the Frankenberger Church (1108, restored 1880), both with ancient frescoes; the emperor's house, built in 1050 by Henry III., the dwelling-house of the emperors till the middle of the 13th century, the meeting place of more than 20 imperial diets, restored in 1867–1880; the town house, built in 1136–1184; and the Kaiserworth, an old building containing statues of eight emperors. To the S. of the town is the Rammelsberg, a mountain formerly very rich in silver, gold, copper, lead, sulphur, and green vitriol. The mines have been worked since 968. Goslar was founded by Henry I. in 920. About 1350 it joined the Hanseatic League. Its ancient prosperity began to depart from it in the middle of the 16th century; and it suffered severely in the Thirty Years' War. In 1802 it ceased to be a free imperial town and fell to Prussia, to whom it again returned in 1866, after having in the meantime belonged to Westphalia (from 1807) and Hanover (from 1816). Here were born Henry IV. and Marshal Saxe. The Wordsworths were here in 1798. Pop. (1900) 16,403.

Goslarite, an orthorhombic, white, reddish, bluish, transparent or translucent, brittle mineral of vitreous luster and nauseous taste. Hardness, 2-2.5; specific gravity, 1.9-2.1. Composition: Sulphuric acid, 27.9; oxide of zinc, 28.2; water, 43.9. Called also gallitzenite.

Goslavski, Maurycy (gôs-läv'skē), a Polish poet; born in Podolia in 1802. He was a soldier by profession; but published a volume of poetry in 1828. He took part in the war for Polish Independence in 1830, at which time he produced his most famous stanzas, "The Poems of a Polish Uhlan." They were very popular among his countrymen during the great agitation. He died in Stanislavof, Aug. 17, 1834.

Gospel, a word used as the English equivalent of the Greek *evangelion,* or rather *euaggelion,* a good or joyful message. In the New Testament it denotes primarily the glad tidings respecting the Messiah and His kingdom — this was emphatically the Gospel (Anglo-Saxon, *gôdspell,* good tidings). It was quite naturally employed as a common title for the historical accounts which record the facts that constitute the basis of Christianity.

It may be fairly said that the genuineness of the four narratives written by Matthew, Mark, Luke, and John rests on better evidence than that of any other ancient writings. They were all composed in the latter half of the 1st century; those of Matthew and Mark some years before the destruction of Jerusalem; that of Luke about the year 64; and that of St. John about the close of the century. Before the end of the 2d century we have abundant evidence that the four Gospels, as one collection, were generally used and accepted. They seem to have been viewed as so many original and independent sources, each one as much so as the others. The critical spirit of modern times has refused to halt at this point; it has sought to get at, so to speak, the genealogy of the several Gospels with their different degrees of relationship. Each of the four Gospels has in turn been assumed by different critics to be the first out of which the others arose; and the theory has been more than once propounded of some prior, more strictly original document, no longer extant, which formed the common basis of them all. The fourth Gospel, as the narrative coincides with that of the other three in a few passages only, is not drawn into the discussion, and the received explanation is the only satisfactory one with respect to it, namely, that John, writing last, had seen the other Gospels, and purposely abstained from writing anew what had been sufficiently recorded. Another conjecture is that the Gospels sprang out of a common oral tradition. According to this view of the origin of the Gospels, that of Mark, if not the oldest in composition, is yet probably the most direct

and primitive in form; it is the testimony delivered by Peter, possibly with little alteration. A comparison of the three synoptical Gospels (those of Matthew, Mark, and Luke) yields some interesting results. If we suppose the history they contain to be divided into sections in 42 of these all the 3 narratives coincide; 12 more are given by Matthew and Mark only, 5 by Mark and Luke only, and 14 by Matthew and Luke. To these must be added five peculiar to Matthew, two to Mark, and nine to Luke. But this applies only to general coincidence as to the facts narrated; the number of passages either verbally the same, or coinciding in the use of many of the same words, is much smaller.

Several biographies of Jesus and the holy family written by unknown authors of the 2d, 3d, and later centuries are known as Apocryphal Gospels. They have no historical or doctrinal value whatever. The titles of the best known of these are: The Gospel of James, The Gospel of Joseph the Carpenter, the Gospel of Thomas, The Gospel of Nicodemus, The Acts of Pilate, and his Letter to Tiberias, etc.

Gospellers, a word used with three different designations: (1) A term applied by the Roman Catholics to those Reformers who taught the people the words of Scripture in their own vulgar tongue, as Wyclif and his followers. (2) A class of Antinomians, about the period of the Reformation, who drew "strange inferences" from the doctrine of predestination. (3) The priest who reads the Gospel in the communion service of the Church of England, standing on the N. side of the altar.

Gospel Lights, in ecclesiology and Church history, two lighted candles borne by acolytes who stand facing the deacon as he intones the Gospel at high mass.

Gosport (God's port), a market-town and seaport of England, county of Hants, on the W. shore of Portsmouth harbor, and directly opposite Portsmouth, with which it is connected by a floating bridge. There are an extensive iron foundry for the manufacture of anchors and chain cables, naval powder magazines, several barracks, the Royal Clarence victualling yard, which contains a brewery, a biscuit-baking establishment, and numerous storehouses, and Haslar Hospital. Pop. (1901) 28,884.

Gossamer, a light filamentous substance which often fills the atmosphere to a remarkable degree during fine weather in the letter part of autumn, or is spread over the whole face of the ground, stretching from leaf to leaf, and from plant to plant, loaded with entangled dew-drops, which glisten and sparkle in the sunshine. It is now known to be produced by small spiders, not by any single species, but by several, not improbably many, species; while it is also said to be produced by young and not by mature spiders. It is not yet well known if the gossamer spread over the surface of the earth is produced by the same species of spider which produces that seen floating in the air, or falling as if from the clouds. Why gossamer threads or webs are produced by the spiders at all is also a question not very easily answered. That they are meant merely for entangling insect prey does not seem probable; the extreme eagerness which some of the small spiders known to produce them show for water to drink has led to the supposition that the dew-drops which collect on them may be one of the objects of the formation of those on the surface of the ground, while it has been also supposed that they may afford a more rapid and convenient mode of transit from place to place than the employment of the legs of the animal. As to the gossamers in the air, conjecture is still more at a loss. They are certainly not accidentally wafted up from the ground, as might be supposed; the spiders which produce them are wafted up along with them; but whether for the mere enjoyment of an aërial excursion, or in order to shift from place to place, is not clear. The threads of gossamer are so delicate that a single one cannot be seen unless the sun shines on it; but, being driven about by the wind, they often become beaten together into thicker threads and flakes. They are often to be felt on the face when they are scarcely visible. The spiders which produce these threads shoot them out from their spinnerets, a viscid fluid being ejected with great force, which presently becomes a thread; sometimes several such threads are produced at once in a radiating form, and these, being caught by the ascending current of heated air, are borne upward, the spider with them. It has been said that the spider has even some power of guiding in the air the web by which it is wafted up (see SPIDER).

Gosse, Edmund, an English author; son of Philip Henry Gosse; born in London, Sept. 21, 1849; became librarian to the House of Lords in 1904. As a poet he is known by "Madrigals, Songs, and Sonnets"; "On Viol and Flute"; "The Unknown Lover"; etc. Some of his literary criticisms and biographies are in "Seventeenth Century Studies" and "From Shakespeare to Pope." He wrote also in prose "Northern Studies" (1879); "Gossip in a Library" (1891); "History of Modern English Literature" (1897); "Life and Letters of Dr. John Donne" (1899); etc.

Gosse, Philip Henry, an English naturalist; born in Worcester, England, April 10, 1810. In 1827 he went to Newfoundland

as a clerk, and was afterward in turn farmer in Canada, schoolmaster in Alabama, and professional naturalist in Jamaica. Returning to England, he published "Canadian Naturalist" (1840); and after another stay in the West Indies settled in England to a busy life of letters. He wrote "Birds of Jamaica" (1851); "A Naturalist's Sojourn in Jamaica" (1851); "Naturalist's Ramble on the Devonshire Coast" (1853); "Aquarium" (1854); "Manual of Marine Zoölogy" (1855–1856); "Romance of Natural History" (1860–1862), his best known work; "Actinologia Britannica" (1860); "Prehensile Armature of the Papilionidæ" (1885). In 1886 he placed in the hands of Dr. C. T. Hudson the notes and drawings of a lifetime on the microscopic study of the *Rotifera*. He was elected a Fellow of the Royal Society in 1856. He spent the last 30 years of his life in Torquay, a retired South Devon village, where he died Aug. 23, 1888.

Gossypium (-sip'i-um), a genus of *Malvaceæ*, tribe *Hibiscæ*. The leaves are generally three or five-lobed; around the flower is an involucre, cordate at the base, and terminating at the apex in three broad, deeply-cut segments. Calyx five-toothed, corolla of five petals, stamens united into a column, fruit a three or five-celled capsule, each cell when ripe bursting through the middle and exhibiting the seeds enveloped in cotton. The species cultivated in the United States, which furnishes so much cotton, is *G. barbadense*, of which there are two well-marked varieties, the sea-island or long-staple cotton, and the upland, Georgian, bowed, or short-staple cotton; that of India is *G. herbaceum*. How many more species exist has not been determined, the genus being very variable. A bland oil is made from the seeds, which also, after having been pressed, have been used as a food for cattle. Martius states that in Brazil the young leaves and seeds of *G. vitifolium* are used in dysentery, and steeped in vinegar are applied to the head in hemicrania. See COTTON.

Gossypium Phospho, a valuable fertilizer forming an important branch of manufacture in the Southern States, in which cotton-seed meal, once used only as stock feed, is mixed with pulverized phosphate rock. The headquarters of the industry is at Atlanta, Ga., where one factory has an output of 15,000 tons annually. The phosphate rock, which comes from South Carolina, passes through huge mills of great power, and is ground into a fine powder, after which it is carried through draught pipes to the top of a six-story tower, and there undergoes a process of refinement. The rich yellow meal which comes from the cotton-seed oil mills in the immediate vicinity is mixed with the ground phosphate, and adds materially to its strength as a fertilizer. The mixture thus obtained is collected into immense bins, and treated with sulphuric acid, assuming a semi-liquid state. It is then called gossypium phospho.

Goszczynski, Severin (gōsh-chin'skē), a Polish poet; born in Ilinze, in the Ukraine, in 1803. The influence of Byron is unmistakable in his youthful "Castle of Kanioff." In the struggle for independence in 1830 he achieved brilliant feats of arms, and composed national odes that spread his fame throughout Europe. Polish freedom proving a chimera, he wandered through France and Switzerland, writing poetry and prose as occasion served. "The Terrible Huntsman," "The Three Chords," and "Dziela" are powerful poems. He died in Lemberg, Feb. 25, 1875.

Got, François Jules Edmond (gō), a French actor; born in Lignerolles, Orne, Oct. 1, 1822. He entered the conservatoire in 1841, and in 1844 made his début at the Comédie Française in a servant's part. He rapidly pushed his way to the front rank, and was recognized as one of the finest comedians of his day. From 1850 to 1866 he was a member of the Comédie Française, playing with success such parts as Figaro in the older comedy, but in general regarded as the mainstay of the new dramatic school. In 1866, with the emperor's special permission, he appeared at the Odéon as André Lagarde in Augier's "Contagion," and organized a company to carry the play through France. He played repeatedly in London. In 1881 he was decorated with the cross of the Legion of Honor. His most finished performances were as Giboyer in Augier's "The Shameless" and as Bernard in "The Fourchambaults." He died March 21, 1901.

Gotha (gō'tä), a town of Germany, alternately with Coburg the capital of the duchy of Saxe-Coburg-Gotha, 31 miles W. by S. of Weimar, on the N. outskirts of the Thuringian Forest. It is a handsome, well-built town, with fine parks. The principal public building is the castle of Friedenstein, built in 1648, 78 feet above the town; it contains a library of 200,000 volumes and 6,000 MSS., and a very valuable numismatic collection. The new museum (1878), in the Renaissance style, contains the picture gallery, in which Cranach, Van Eyck, Holbein, Rubens, and Rembrandt are represented; a very excellent cabinet of engravings; a natural history collection; collections of Egyptian, Roman, Greek and German antiquities; and a Japanese and Chinese museum. A new observatory was built in 1874. Gotha is an active industrial town, the principal manufactures being shoes, fire engine pipes, sugar, and toys. Gotha sausages have a widespread celebrity. Several hundreds of designers, engravers, printers, and map-col-

orers are employed here in the geographical establishment of Justus Perthes, who also publishes the "Almanach de Gotha" (see ALMANAC). Pop. (1905) 36,947.

Gotha, Duchy of. See SAXE-COBURG-GOTHA.

Goth, one of an ancient race belonging to the Teutones, who originally occupied a great portion of European and Asiatic Russia. Filmer, their king, conducted a body of his nation to the coast of the Euxine, where it afterward increased into a numerous and formidable people under the names of Visigoths and Ostrogoths, the former occupying the countries to the W. of the Dneiper, the latter those to the E. The Visigoths crossed the Danube, plundered Rome and Italy, and fixed their residence in Spain, while their kindred, the Ostrogoths, took possession of Italy, which they held till A. D. 544, when they were overthrown by Narses, general of Justinian. From this time the Goths as a nation make no figure in history, except in Spain; but traces of their language, manners, and arts are still to be found in every country of the East. A branch of the Visigoths, settled in Mœsia, the modern Bulgaria, are known as Mœsogoths, and the translation of a great portion of the Bible by Wulfila, or Ulfila, a Christian bishop, about A. D. 350, fragments only of which have come down to us, is the earliest known specimen of the Gothic or Teutonic tribe of tongues. Figuratively, a barbarian; one deficient in or utterly without taste; a rude, ignorant person.

Gotham, a parish of Nottinghamshire, England. The people here were famed for their stupidity and simplicity, which obtained for them the satirical appellation of the "wise men of Gotham." Also a colloquial term for the city of New York. Thus applied it first appeared in "Salmagundi," by Washington Irving and James K. Paulding, and is supposed to hint sarcastically at the worldly wisdom of its inhabitants.

Gothard, St. See ST. GOTHARD.

Gothenburg System, The, a licensing system, under which in Gothenburg, Sweden, the public-house licenses are granted to a company, which, after paying the expenses of management with 6 per cent. annual interest on the shareholders' capital, makes over the profits to the town treasury. This plan has been in force since 1865.

Gothic, a term sometimes used to distinguish mediæval from classical architecture. In a more limited sense it comprehends those styles only of mediæval architecture which are characterized by the pointed arch. In the narrower sense, Gothic architecture dates from the middle of the 12th century; in the wider, it includes as well Anglo-Saxon, which prevailed from the close of the 6th to the middle of the 11th century, and also Anglo-Norman, which flourished during the succeeding 100 years. The latter was followed by the Semi-Norman or Transition; this gave place, at the beginning of the 13th century, to Early English, and this, at the commencement of the 14th century, to Decorated English, replaced at the beginning of the 15th century by the Florid, or Perpendicular. Gothic architecture attained its perfection in the Decorated English period. The free, flowing lines and the chaste ornamentation by which it is distinguished degenerated into the stiff, staring lines and the too elaborate decoration of the Perpendicular; and the process of debasement continued till in the early part of the 17th century Gothic fell into entire disuse. Toward the close of the 18th century a reaction began, and the movement has gone on gathering strength ever since. See DECORATED: EARLY ENGLISH: PERPENDICULAR: POINTED.

Also the language of the Goths. It belongs to the Low German group of the Teutonic dialects, to which belong English, Frisian, Dutch, Flemish, and Old Saxon. It is the oldest and most primitive of the Teutonic dialects of which any remains are known; it was spoken by the Eastern and Western Goths, who occupied the Province of Dacia. It is closely akin to English and Dutch.

Gothland, the S. of the three old provinces of Sweden; area 35,803 square miles; pop. 2,595,194. Also a Swedish island in the Baltic, 44 miles E. from the mainland, and with Farö, Gotska Sandö, and other smaller islands constituting the Province of Gottland or Wisby; area, 1,219 square miles; pop. (1906) 53,399. The island consists mainly of terrace-like slopes of limestone, encircled by cliffs broken by numerous deep fiords, more especially on the W. coast; the E. parts are flat. The climate is mild. Next to agriculture, the chief occupations of the inhabitants are shipping, fishing, seal-fishing, fowling and lime-burning. In the Middle Ages the island belonged to the German Hanseatic League, but was restored to Sweden in 1645. Capital, Wisby.

Gottenburg, or **Gothenburg** (got'enbörg), a seaport town in Sweden, the second in importance, capital of the län of the same name; at the mouth of the Göta, in the Kattegat, 255 miles W. S. W. of Stockholm, intersected by canals. It is one of the best built towns in Sweden, and the seat of a bishopric. It has manufactures of sail-cloth, cotton, and other goods, and possesses ship-building yards, tobacco factories, breweries, sugar refineries, etc. The trade is very extensive, the harbor being excellent and always free from ice. It has a good depth of water, is defended by forts, and

there is a dry dock cut in the solid rock. The completion of the Göta canal and railway facilities have increased its importance. Among social reformers the town is noted for its management of the liquor question. Pop. (1906) 140,851.

Gotter, Friedrich Wilhelm (gōt'ter), an epoch-making German poet; born in Gotha, Sept. 3, 1746. He wrote dramas while studying foreign literatures at the university; entered the diplomatic service, but gave it up to become a private tutor, and fell under the influence of Goethe. "Media," a drama, a volume of collected "Poems," and numerous comedies and minor pieces, represent his highest efforts. He was the last German poet to use French models largely. He died in Gotha, March 18, 1797.

Gottfried von Strassburg (got'frēd fon sträs'borg), a famous mediæval German poet; he flourished about the close of the 12th and the beginning of the 13th century. He was contemporary with Hartmann von Aue, whom he celebrates as the first of German narrators, Wolfram von Eschenbach, to the prologue of whose "Parzival" he alludes, and Walter von der Vogelweide. Gottfried's poem, "Tristan and Isolde," extends to 19,552 short rhymed lines, was left unfinished, ending abruptly, but was completed about 1233–1236 by Ulrich von Türheim. Wagner used it in "Tristan and Isolde."

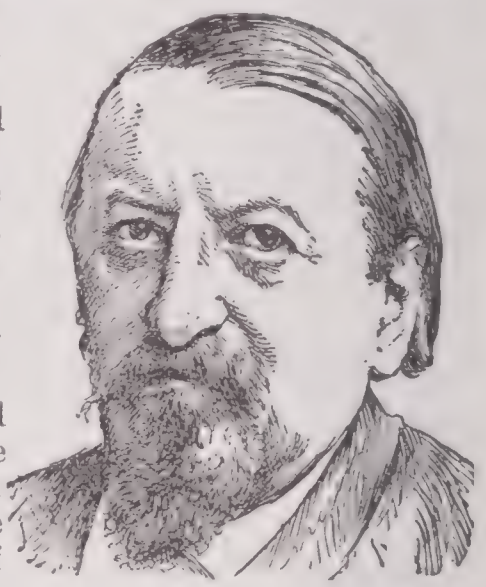
Gotthelf, Jeremias. See BITZIUS, ALBERT.

Göttingen (get'ting-en), a town in the former kingdom of Hanover; 538 feet above sea-level on the Leine; 67 miles S. of Hanover, and 36 N. E. of Cassel. The celebrated university (Georgia Augusta), was founded in 1734–1737. Connected with it are the library of 500,000 volumes and 5,000 MSS., the art museum, the splendid botanic garden (laid out by Haller), the observatory, the laboratory, the lying-in hospital, etc. Longfellow, Motley, Ticknor, Bancroft, and several other illustrious Americans studied at Göttingen, whose native alumni include many of Germany's most famous sons. The Göttingen Poet-League was a small poet band (Voss, the two Stolbergs, Klopstock, Bürger, etc.) who in the "storm and stress" days of 1770–1778 did much for the revival of national feeling; by the "Göttingen Seven" are meant the seven professors (Albrecht, Dahlmann, Ewald, Gervinus, the two Grimms, and Weber) who for their liberal tendencies were in 1837 expelled by King Ernest Augustus. The book trade is of more importance than the manufactures — woolens, sugar, chemicals, etc. Raised to a town in 1210, and a considerable member of the Hanse in the 14th century, Göttingen suffered much during the Thirty Years' War, when it was taken by Tilly in 1626, and recaptured by the Swedes in 1632. Pop. (1900) 30,234.

Gottlieben (got'lē-ben), a small town of Thurgau canton, Switzerland, 1 mile W. of Constance; its castle was the prison of John Huss, Jerome of Prague, and Malleobus.

Gottschalk, Louis Moreau, an American pianist and composer; born in New Orleans, La., May 8, 1829. His marked musical ability induced his father to send him to Paris to receive further education. In 1848 his series of public concerts in Paris met with much success. He afterward appeared in the United States and in Mexico and South America. He died near Rio de Janeiro, Brazil, Dec. 18, 1869.

Gottschall, Rudolf von (got'shäl), a German critic; born in Breslau, Sept. 30, 1823. Among his works in criticism are: "Pictures of Travel in Italy"; "Portraits and Studies"; "Studies in the Direction of a New German Literature"; and "Literary Silhouettes." His critical studies were not permitted to interrupt the production of brilliant plays, stories and poems.


RUDOLPH VON GOTTSCHALL.

Gottsched, Johann Christoph (got'shed), a German critic and author; an important figure in the history of German literature; born in Judithenkirch, near Königsberg, Prussia, Feb. 2, 1700. At the University of Königsberg he studied philosophy, belles-lettres, and languages. In 1724 he removed to Leipsic, where in 1730 he became Professor of Philosophy and Poetry, and in 1734 Professor of Logic and Metaphysics. Between 1729 and 1740 Gottsched exercised a sort of Johnsonian dictatorship in the world of polite literature in Germany. His chief endeavors were directed to the reformation of the German drama. He became pedantic and vain; his critical faculty became distorted; he manifested a petty jealousy of all literary authority save his own, opposing himself to the Swiss writers Bodmer and Breitinger, and refusing to see any merit in Klopstock and Lessing. His own model drama, "The Dying Cato" (1732), notwithstanding its immense success, is sadly barren of poetry and dramatic action. He did, however, leave one

useful work, connected with the "History of German Dramatic Poetry" (1757–1765), an unfinished catalogue of plays from 1450 to 1760. He died in Leipsic, Dec. 12, 1766.

Götz von Berlichingen. See BERLICHINGEN, GŒTZ VON.

Gouania, a genus of *Rhamnaceæ,* consisting of evergreen climbers. *G. domingensis,* a species from the West Indies and Brazil, is stomachic.

Gouda (Dutch, *Ter Gouwe*), a town of Holland, in the province of South Holland, 11 miles N. E. of Rotterdam; separated into two unequal parts by the Gouwe river, which here unites with the Ijssel on the right bank. The town is entered by five gates, is composed of neatly-built houses, and every street, large and small, has a canal in its center. The great market-place is the largest in Holland, and the town-hall in its center is a spacious, substantial edifice with a tower and spire. The Calvinistic church of St. John, founded in 1485, is noted for its painted glass windows, executed partly by the brothers Wouter and Dirk Crabeth; and said to be among the finest in Europe. The surrounding country is laid out in beautiful gardens. Pop. (1906) 23,785.

Gouge, in bookbinding, a finisher's hand tool for blind tooling or gilding, having a face which forms a curve. Also a shaped incising tool used for cutting out forms or blanks for gloves, envelopes, or other objects cut to a shape from fabric, leather, or paper. In woodworking, a chisel with a curved blade adapted to make a rounded groove in cutting or turning wood. They are known as flat, middle, and quick; their curves being respectively obtuse, medium, and acute. The gouge existed in early ages in stone, bone, and bronze.

Gough (gof), **Hugh Gough, Viscount,** an English military officer; born in Woodstown, Limerick, Ireland, Nov. 3, 1779. He served at the Cape, in the West Indies, and through the Peninsular war, especially distinguishing himself at Talavera and Vittoria. In 1837 he went to India as Major-General, and in the following year was made commander-in-chief of the forces sent against China. After storming Canton and forcing the passage of the Yang-tsze-Kiang, he compelled the Chinese to sign the treaty of Nanking (1842). In 1843 he defeated the Mahrattas at Maharajpur, and brought about the peace of Gwalior. On the outbreak of the Sikh war in 1845 he worsted the enemy in the brilliant battles of Mudki, Firozshah, and Sobraon, for which he was given a peerage. In 1848 the Sikhs renewed the war, but were again defeated by Gough at Ramnagar, Chillianwalla, and Gujerat, victories which resulted in the annexation of the Punjab to British India. Gough was in 1849 created a viscount, and about the same time returned to England. He was made field-marshal in 1862, and died near Dublin, March 2, 1869.

Gough, John Bartholomew, an American temperance lecturer; born in Sandgate, Kent, England, Aug. 22, 1817. His father was a pensioner of the Peninsular war, his mother a village schoolmistress. At the age of 12 he was sent to America, and worked on a farm in Oneida co., New York. In 1831 he went to New York city, where he found employment in the binding department of the Methodist book establishment; but habits of dissipation lost him this employment, and reduced him to that of giving recitations and singing comic songs at low grog shops. He was married in 1839; but his drunken habits reduced him to poverty and delirium tremens, and probably caused the death of his wife and child. In 1842 a benevolent Quaker induced him to attend a temperance meeting and take the pledge; and soon afterward, resolving to devote the remainder of his life to the cause of temperance, Gough attended temperance meetings and related his experience with such effect as to influence many others. A few months later he had a short relapse into drunkenness; but an eloquent confession restored him to favor, and he lectured with great pathos, humor, and earnestness in various parts of America. In 1853 he was engaged by the London Temperance League, and lectured for two years in the United Kingdom, where he attracted large crowds to his meetings. He was again in England in 1857–1860 and 1878. In some of his later addresses he took up literary and social topics, and acquired a moderate fortune by his lectures. He published an "Autobiography" (1846); "Orations" (1854); "Temperance Address" (1870); "Temperance Lectures" (1879); and "Sunlight and Shadow, or Gleanings from My Lifework" (1880). He died in Frankford, Pa., Feb. 18, 1886.

Gough, Richard, an English antiquary; born in London, England, Oct. 21, 1735. On leaving Benet (now Corpus Christi) College, Cambridge, in 1756, he began work as a professed antiquarian by a visit to Peterborough and Crowland, and continued to make similar excursions down to 1771. Two years later he commenced the preparation of an English version of Camden's "Britannia" (1789). But three years previously he had published his important "Sepulchral Monuments of Great Britain," which was brought down only to the end of the 15th century. Among numerous minor works from Gough's pen was a "History of the Society of Antiquaries of London" (1770). He died in Enfield, Middlesex, England, Feb. 20, 1809.

Goujon, Jean (gö-zhôn′), a French sculptor and architect; born in Paris in 1515. He was employed on the church of St. Maclou, at Rouen in 1540, and on the cathedral there 1541; worked with Pierre Lescot, architect of the Louvre, on the restorations of St. Germain l'Auxerrois, 1542–1544; was employed with Bullant on the Chateau d'Ecouen; and on the accession

JEAN GOUJON.

of Henry II. entered the royal service. In the Louvre he executed the reliefs of the Escalier Henri II., the carvings at the S. W. angle of the court, and the "Tribune of the Caryatides," and he was the author of what is considered the masterpiece of French sculpture, the "Huntress Diana," now in the Louvre collection. There is no direct evidence of his death, but it is believed to have occurred in the St. Bartholomew massacre in 1572.

Goulburn, a town of New South Wales; 134 miles S. W. of Sydney; with several tanneries, boot and shoe factories, flour mills, and breweries, and a busy trade in agricultural produce. It is a substantially built town, with gas and a good supply of water. The seat of an Anglican and of a Roman Catholic bishop, it contains a handsome Church of England cathedral (Gothic, consecrated in 1884), and a Roman Catholic cathedral. It has also a Catholic college and a convent. Pop. (1901) 10,680.

Goulburn, Edward Meybrick, an English clergyman; born in 1818. He was educated at Eton and Balliol College, Oxford, where he was graduated in 1839, and in 1841 was elected a Fellow of Merton. After holding the Oxford incumbency of Holywell, he became headmaster of Rugby (1850–1858); prebendary of St. Paul's (1858); chaplain to the queen, and vicar of St. John's, Paddington (1859); and Dean of Norwich (1866), which office he resigned in 1889. Among his publications are "The Philosophy of Grammar, with Especial Reference to the Doctrine of the Cases" (1852); "Thoughts on Personal Religion" (1862); and "The Office of the Holy Communion" (1863).

Gould, Augustus Addison, an American naturalist; born in New Ipswich, N. H., April 23, 1805; was graduated at Harvard College, 1825, and its medical department 1830; spent some time as scientific instructor there; began practising in Boston, and was appointed visiting physician to the Massachusetts General Hospital in 1856. His scientific studies led him to the special fields of botany, zoölogy, and conchology; in the latter he became one of the most eminent authorities in the world. He aided Sir Charles Lyell in his geological investigations in the United States. He died in Boston, Mass., Sept. 15, 1866.

Gould, Benjamin Apthorp, an American astronomer; born in Boston, Mass., 1824. He was graduated at Harvard in 1844 and pursued his scientific studies abroad. In 1849 he received an appointment to the United States Coast Survey, and devised methods for determining the longitudes telegraphically. From 1870 to 1885 he was director of the national observatory at Cordova, Argentine Republic, where he completed three extensive catalogues of stars, and conducted meteorological and climatological investigations. He was the founder and editor of the "Astronomical Journal" (1849–1861). His principal works are: "On the Transatlantic Longitude, as Determined by the Coast Survey" (1869); "Uranometria Argentina" (1879), which gives the brightness and the position of every fixed star, to the 7th magnitude inclusive within 100 degrees of the South pole. He died in Cambridge, Mass., Nov. 26, 1896.

Gould, Sir Francis Carruthers, an English cartoonist; born in Barnstaple, in 1844. When a boy he filled a position in a local bank, and at 20 years of age went to London and entered a stockbroker's office, eventually himself becoming a member of the Stock Exchange. As a youth his genius for caricature was noticeable and he soon began to make use of his talent by illustrating at first "Truth" and later the "Pall Mall Gazette" and "Budget." He was afterward identified with the "Westminster Gazette," of which he was assistant editor. His "Cartoons for the Crisis," during the general election of 1895, gave him a wide reputation as a political caricaturist. He was knighted in 1906.

Gould, Hannah Flagg, an American poet; born in Vermont in 1789. Among the

collections of her verse are "Hymns and Poems for Children"; "The Golden Vase"; "The Youth's Coronal"; etc. The best known piece by her is "The Snow-Flake and the Frost." She died in 1865.

Gould, Helen Miller, an American philanthropist; born in New York city, June 20, 1868; daughter of the late Jay Gould. She became widely known through her various gifts for charitable and educational purposes. When the war with Spain broke out she gave $100,000 to the United States government and became an active worker in the Woman's National War Relief Association, contributing freely to its work. When the sick and convalescent soldiers were taken to Camp Wikoff, L. I., she gave $25,000 to purchase needed supplies and in person cared for many of the sick. Her other gifts include $380,000 to the University of New York, etc., in 1898; $50,000 to the Naval Branch of the Young Men's Christian Association of Brooklyn; and $100,000 to the University of New York for a Hall of Fame for Great Americans, in 1900.

Gould, Jay, an American financier; born in Roxbury, N. Y., May 27, 1836; was brought up on his father's farm; attended Hobart College a short time, acquired a taste for mathematics and surveying; made surveys of Ulster, Albany, and Delaware counties, and began his railroad career directly after the panic of 1857; invested in bonds of the Rutland and Washington railroad, and became president, treasurer, and superintendent of the road. Soon afterward he effected a consolidation of his road with the Rensselaer and Saratoga road, withdrew his capital, removed to New York, opened a broker's office, and began dealing in Erie stocks and bonds. In association with James Fisk, Jr., he entered the directory of the company, and was elected president, with Fisk as vice-president and treasurer. On the reorganization of the company, 1872, he lost official connection with it. He then invested heavily in the various Pacific railroads, secured control of a number of important lines, built branches, and effected combinations which resulted in the establishment of what is known as the "Gould system." He died in New York city, Dec. 2, 1892, leaving property valued at $72,000,000.

Gould, John, an English ornithologist; born in Lyme-Regis, Dorset, England, Sept. 14, 1804. In 1827 he was appointed curator to the Zoölogical Society's Museum, and in 1838 proceeded to study the Australian birds in Tasmania, South Australia, and New South Wales. The results of his researches are embodied in his great work on the "Birds of Australia" (7 vols. 1840–1848). His other important works are: "A Century of Birds from the Himalayan Mountains"; "The Birds of Europe" (1832–1837); "The Mammals of Australia"; "The Birds of Great Britain." He died in London, Feb. 3, 1881.

Gould, Robert Freeke, an English barrister and writer on Freemasonry; born in Ilfracombe, Devonshire, England, in 1836. From 1860 to 1862 he participated in military campaigns in Southern China, and in different expeditions against the Tai Ping rebels. His works include: "The Atholl Lodges" (1879); "The Four Old Lodges" (1879); "The History of Freemasonry: Its Antiquities, Symbols, Constitutions, Customs, etc." (6 vols. 1884–1887).

Goulding, Francis Robert, an American story-writer; born in Georgia in 1810. He was a Presbyterian clergyman. He wrote: "Young Marooners on the Florida Coast"; "Marooner's Island"; and other tales for boys. He died in 1881.

Gounod, Charles François (gö-nō′), a French composer; born in Paris, France, June 17, 1818. He studied at the conservatoire under Halévy, Lesueur, and Paer. Obtaining the first prize in 1839, he was sent to Rome to complete his musical education, and while there devoted himself chiefly to religious music. On his return to Paris he was for a time attached to the church of the "Foreign Missions," where his earliest compositions were performed; one of them, a "Solemn Mass," was the first work which brought him into general notice. For a time he contemplated taking orders, and went through part of the preliminary novitiate. His first opera, "Sappho," was produced in 1851. His comic opera, "The Physician in Spite of Himself" (1858), was a great success; it was followed in 1859 by "Faust," his chief work, which at once attained European popularity, and raised its composer to the foremost rank of contemporary musicians. It was followed by "Philemon and Baucis" (1860); "The Queen of Sheba" (1862); "Mireille" (1864); "Romeo and Juliet" (1867); "Polyeucte" (1878); "The Tribute of Zamora" (1881). He also published much church music, including several masses, hymns, and motets or anthems, and was extensively popular as a song-writer. From 1870 to 1875 he resided in England. He was a member of the Institute (1866), and a commander of the Legion of Honor (1877). He died in St. Cloud, France, Oct. 18, 1893.

Goura (gö′rä), the characteristic musical instrument of the black tribes of South Africa, shaped like the bow of a Hottentot, with the string made of intestines, retained at one end by a knot in the barrel of a quill flattened and cleft. The performer holds his instrument, while playing, in the man-

ner of a huntsman's horn, the quill being applied to his mouth, and by alternate expiration and inspiration, many players are able to draw from the goura melodious notes.

Also a genus of beautifully crested ground-loving pigeons, including the largest and perhaps finest members of the family. They inhabit New Guinea and adjacent islands, where they are fond of walking in pheasant-like fashion along the forest paths. They nest on trees and feed on fruits. The first known species, *G. coronatus*, is a beautiful bird over two feet in total length, with the characteristic fan-like crest on the head. It is sometimes kept among poultry, and its flesh is much esteemed.

Gourd, *Cucurbita pepo*, a hispid plant, with tendrils, large yellow flowers, and oblong or ovate fruit; a native of Astrakhan, but cultivated in many countries. It has run into many varieties. The fruit is used as a culinary vegetable in soups and stews, or mixed after being sugared and spiced, with sliced apples, to constitute pumpkin pie. Called also the pumpkin gourd or pompion. The squash is regarded as one of the best gourds, and is much cultivated in some parts of Europe and in North America.

The Hebrew word translated gourd in Scripture is apparently so much akin to the Greek word *kiki*, used by Dioscorides for the castor-oil plant (*Ricinus communis*), that the "gourd" of Scripture was probably that species. It is a euphorbiaceous plant, and not of the order *Cucurbitaceæ*.

The wild gourd of Scripture is a plant which grew on a wild vine — *i. e.*, was procumbent, and had tendrils. It moreover produced "death in the pot"; discoverable in a moment by the taste. It was probably either the colocynth (*Citrullus colocynthis*), or the squirting cucumber (*Momordica elaterium*), the one called by Gesenius by its ancient name, *Cucumis agrestis*. See CUCUMBER: PUMPKIN: SQUASH, etc.

Gourd Tree, *Crescentia cujete*, more frequently called in English the calabash tree.

Gouridæ (gör'i-dē), ground pigeons; a family of pigeons having certain affinities to the gallinaceous birds. They feed on the ground in flocks. They are found in the hotter parts of both the Eastern and Western hemispheres.

Gourock, a watering place of Renfrewshire, Scotland, on the Firth of Clyde, 3 miles W. N. W. of Greenock, by a railway opened in 1889, since which time it has become the starting point of Irish and other steamers. At Kempoch Point here, behind which rises Barrhill (478 feet), stands "Granny Kempoch," a prehistoric monolith associated with the witches of Renfrewshire (1662). In 1688 the first red herring ever cured in Great Britain was cured at Gourock.

Gously, an old form of harp used by the Slavonians, whose bards were called gouslas, the poetry which they chanted being called gouslo.

Gout, a disease produced by the excess of uric acid in the blood in the form of urate of soda. It is usually hereditary, is rare before the age of 30, and generally arises from excessive indulgence in wines or malt liquors, the last giving rise to "poor man's gout." It is rarely produced by the use of spirits. The great toe is the part most frequently affected, pain and irritability are leading symptoms; it may become chronic, and is very intractable to treatment. When it attacks internal parts it is termed irregular or retrocedent gout, and is proportionately more dangerous. Diet requires strict regulation, with abstemiousness or abstinence from alcoholic liquors. Excessive exertion and fatigue, or mental labor, have been known to produce gout also, but whenever it is, as it usually is, hereditary, extreme precautions ought to be taken to prevent the occurrence or recurrence of an attack.

Gouvion-St.-Cyr, Laurent (gö-vi-ôn-san-ser'), a French marshal; born in Toul, France, April 16, 1764. He distinguished himself in the campaign on the Rhine, 1795; and under Moreau and Joubert, in the campaign of Italy. After the fall of Napoleon he was made a peer of France, and served as minister of war. The latter years of his life were occupied in the composition of his several memoirs. He died in France, March 17, 1830.

Govean, Felice (gō'vā-än), an Italian dramatist and publicist; born in Racconigi, Piedmont, in 1819. He began as a miscellaneous prose-writer, and founded the democratic "Gazette of the People," which reached an immense circulation. His first plays, "The Waldenses" and "Jesus Christ," attracted wide notice; and the success of "The Siege of Turin" and "The Siege of Alessandria" made his reputation international. His plays are essentially popular in theme and character. He wrote a variety of meritorious short stories.

Government, the form of policy in a state; the mode or system according to which the legislature, executive, and judicial powers are vested and exercised; a system of laws and customs; a constitution. There are numerous forms of government; as aristocracy, democracy, despotism, monarchy, oligarchy, republicanism, etc. Also the council or body of persons intrusted with the administration of the laws; the management of home and foreign affairs, and generally the public business of a state;

the administration; the ministry; the executive power.

Government of the United States. The executive power is vested in the President, who holds office for four years and receives annually $75,000. The Vice-President, as president of the Senate, discharges the duties of that office, except in case of the removal or death of the President, in which event he assumes the executive powers. He is elected for the same term of office as the President, and receives $12,000 annually. The President and Vice-President are elected by electors chosen by the people. The number of electors from each State is equal to the whole number of Senators and Representatives to which the State may be entitled. The electors vote by ballot. These votes are sent sealed to the president of the Senate, who opens them in the presence of Congress. If there are two parties who have received an equal number of votes, the House of Representatives chooses by ballot one of them for President, provided a possible third candidate has not received a majority of the votes, in which case he is entitled to the office. The various cabinet officers are appointed by the President. They are nine in number, and receive $12,000 each annually. The cabinet is arranged in the following order of succession named in the Presidential Succession Act of Jan. 19, 1886, which provides for a successor for the President and Vice-President should they both die while in office:

1. Secretary of State.
2. Secretary of the Treasury.
3. Secretary of War.
4. Attorney-General.
5. Postmaster-General.
6. Secretary of the Navy.
7. Secretary of the Interior.
8. Secretary of Agriculture.

(A ninth department, that of Commerce and Labor, was created in 1903.)

The legislative power is vested in Congress, of which there are two branches; the Senate, which is composed of two members from each State, who hold office for six years, at an annual salary of $7,500; and the House of Representatives, who are elected by a majority of votes cast in the various congressional districts of each State, to hold office two years, and receive $7,500 annually. The President of the United States is commander-in-chief of the army and navy; but the direct supervision belongs to the Secretaries of War and of the Navy.

The judiciary of the United States consists of a Supreme Court, which sits at Washington, and which is composed of a Chief-Justice, who receives $13,000 annually, and eight Associate Justices, who receive $12,500 annually. They are appointed by the President, and hold office during good behavior. The United States is divided into nine judicial circuits, each of which has two or three circuit judges (according to the size of the circuit), who are paid $7,000 a year. There are also 76 district courts, from which an appeal lies to the Circuit Court.

Each State and Territory has its own local government, not unlike the general government in its essential features. The executive authority is vested in the governor, whose term of office and salary vary in different States. The revenue of the national government is chiefly derived from customs duties, proceeds of sales of public lands, and internal revenue taxes upon distilled spirits, fermented liquors, tobacco, etc. In conformity with several acts of Congress, the surplus revenue is devoted to the gradual redemption of the public debt.

Governor, a device which regulates the admission of steam to a steam engine, according to the rate of motion. The intention is to maintain uniform velocity, and any acceleration of speed above a given rate causes a valve to be partially closed, diminishing the area of steam passage; contrariwise in case of flagging in the speed of motion of the engine. The favorite form of governor has a pair of balls suspended from a vertical shaft, so as to swing outward when the shaft is rotated. The greater the speed the greater the centrifugal force, and consequently the farther the balls depart from the axis of rotation; the inclination of the ball arms is made effective in working the valve.

Governor Cut-off, an automatic arrangement in which the acceleration or retardation of the motion of the governor, due to changes of speed of a steam engine, is made to cut off the steam at an earlier or later period of the stroke of the piston, so that with the increased boiler pressure or ligher work the steam shall be cut off earlier in the stroke, and when greater work is imposed on the engine, or the steam pressure flags, the steam cylinder shall receive steam from the boiler during a larger proportion of the stroke of the piston.

Governor Valve, a valve in a steam pipe operated by the governor to vary the area of steam, opening according to the rate of moving, and consequently the requirement of the engine; the object being to maintain a uniform rate. Governor-valve gear, an arrangement of parts whereby the position of the governor balls, resulting from their rate of motion, is made to act on the induction valve of an engine.

Governor's Island, a small island at the main entrance of Boston Harbor; Fort Winthrop is built on it. Also an island in New York harbor; Fort Columbus, the headquarters of the Military Department of the East, U. S. A., is built on it.

Gow, Neil, a Scotch violinist; born in Inver, near Dunkeld, Scotland, March 22, 1727. Before he reached manhood he had become the best performer of reels and strathspeys in Perthshire. He was employed by the principal nobility and gentry throughout Scotland, and Sir Henry Raeburn several times painted his portrait for his patrons. He also composed nearly 100 tunes, mostly of a lively character. He died in Inver, March 1, 1807.

Gow, Nathaniel, a Scotch violinist; youngest son of Neil Gow; born in Inver, near Dunkeld, Scotland, May 28, 1766. He was trained as a violinist in Edinburgh, where in 1782 he became one of the king's trumpeters for Scotland, and subsequently was leader of a fashionable band, and a successful teacher. He published numerous and very full collections of Scotch airs and songs; and his own compositions number over 200, among them "Caller Herring." He died in Edinburgh, Jan. 17, 1831.

Gower, John, an early English poet, a contemporary and friend of Chaucer; born about 1320. He was liberally educated, and was a member of the society of the Inner Temple. His chief works are his "Thinker's Mirror," "Voice of One Crying," and "Lover's Confession," of which the first was a moral tract relative to the conjugal duties, written in French rhymes (now lost); the second a metrical chronicle of the insurrection of the commons under Richard II., in Latin elegaic verse; and the third an English poem in eight books, containing 30,000 lines, relative to the morals and metaphysics of love, one of the earliest products of the English press, being printed by Caxton in 1483. He died about 1408.

JOHN GOWER.

Gown. The academic gown is a survival of the tabardus, a garment with many folds, which came in when the doctors began to wear long priestly robes as a distinctive mark of their standing as clerics. At Padua, for instance, certainly as early as the 16th century, the gown and square cap were the insignia of a doctor; and, at a later period, the undergraduate of Trinity College, Cambridge, England, wore a gown of violet color to distinguish him from the doctors, who wore a scarlet gown. The purple gown common to all rectors of universities has been described as the livery of the Popes. On the continent of Europe the several faculties possess distinctive colors, though in some universities, as at Leipsic and Tübingen, only two colors have been used. In Great Britain a similar custom obtains in the full dress of doctors; the faculty, like the university, of a graduate is indicated by his hood. The gowns of British under-graduates are now black, except at Glasgow, Aberdeen, and St. Andrews. University preachers in England wear academic gowns. In the United States it is becoming more generally the custom for gowns to be worn at colleges for either sex.

Goya y Lucientes, Francisco (gō'yä ē lö-thē-en'tes), a Spanish painter; born in Fuente de Todos, Aragon, Spain, March 30, 1746. He received his first education in art in the academy at San Luis, Saragossa. On his return from a visit to Rome, the talent and speed with which he executed some paintings for the royal tapestry manufactory gained the approbation of the celebrated Mengs, who superintended that work. His scenes from the common life of the Spanish people excited special admiration. In 1780 he was elected member of the academy of San Fernando. Among the most celebrated of his works is the portrait of Charles IV., for which he was made court painter. In 1824 he went to Paris for his health, and continued to reside in France till his death, in Bordeaux, April 16, 1828.

Goyaz (gō-yäz'), the central State of Brazil, in the dry plateau region, rising in the S. to an important range of mountains; area 288,536 square miles; pop. (1900) 255,284. The Tocantins river traverses most of the State from S. to N., and receives the Araguay, which forms the W. boundary; the S. frontier is marked by the Paranahyba. The climate in the S. is healthy, but in the N. malignant fevers are common, and the cattle are subject to goitre. Stock-raising is the chief industry.

Gozan (gō'zan), in ancient geography, a province of Media, to which Tiglath Pileser, and afterward Shalmanezer, sent the captive Israelites (II Kin. xvii: 6). The country was named after the river Gozan, now called the Kizzie Ozan, or Golden river, which rises in N. W. Persia and flows N. E. very tortuously into the Caspian Sea.

Gozlan, Léon (goz-lon'), a French novelist; born in Marseilles, France, Sept. 1, 1803. From a clerk in a Paris bookstore he became a writer for "Figaro," and then produced novels; sometimes socialistic, but well conceived and executed,

with a vein of peculiar irony, but an overelaboration that spoils at times his best effects. "The Notary of Chantilly," "A Millionaire's Most Beautiful Dream," and "The Lambert Family," deserve special mention. He died in Paris, Sept. 14, 1866.

Gozo (got'sō), an island in the Mediterranean, 4 miles N. W. of Malta and belonging to Great Britain; with the adjacent smaller island of Comino, area 20 square miles; pop. about 20,000. The surface is hilly, but the soil fertile. Chief town Rabato, near the center of the island.

Gozzi, Count Carlo (got'sē), an Italian dramatist; born in Venice, Italy, in March, 1722. The publication of several slight but witty and satirical pieces made him known in his native city, and the part he took in combatting the theatrical innovations of Chiari and Goldoni made him famous. One of the best known of his works, from Schiller's translation of it, is "Turandot," which Gozzi himself borrowed from a Persian source (Nizami). His latest dramas were modelled on those of Calderon, but they enjoyed only a moderate success. Gozzi died April 4, 1806.

Gozzi, Count Gasparo, an Italian critic and writer; born in Venice, Italy, Dec. 20, 1713. His first attempts in literature, the translation of dramas from the French for production in the theater of Sant' Angelo at Venice were not successful. But his next ventures, the editing of two journals, "Venetian Gazette" (from 1760) and "Venetian Observer" (from 1761), to which he contributed very copiously, established his fame as one of the most elegant writers of literary Italian. The second of these works was an attempt to imitate the English "Spectator." For some time Gozzi was press censor in Venice. He wrote also: "The Moral World" (1760); "Familiar Letters" (1755), etc. He died in Padua, Dec. 26, 1786.

Gozzoli, Benozzo (got-sō'lē), an Italian fresco-painter; born in Florence, Italy, about 1420. He was a pupil of Fra Angelico. At Montefalco (1450–1452), he painted the "Virgin Giving Her Girdle to St. Thomas" in St. Fortunato, and a series of frescoes illustrating the life of St. Francis, an "Annunciation," and a "Crucifixion," in the monastery of St. Francesco. At Florence (1456–1464) he adorned the Palazzo Riccardi with Scriptural subjects, and painted various similar frescoes at San Gemignano (1464–1467). His name is likewise intimately associated with a series of 24 fine frescoes in the Campo Santo or cemetery at Pisa (1468–1484). He died in Pisa in 1498.

Graaf, Regnier de (gräf), a Dutch physician and anatomist; born in Schoonhoven, Netherlands, July 30, 1641. He studied at Leyden under Dubois (De le Boé), better known as Sylvius, and afterward in France, taking the degree of doctor of medicine at Angers in 1665. The year after he settled at Delft, where he practised till his death. In 1663 he wrote "On the Character and Use of the Pancreatic Juice," which gained him a great reputation. In the course of his investigations in abdominal anatomy he discovered, in 1672, the GRAAFIAN VESICLES (*q. v.*) or follicles of the female ovum (see OVARY). He wrote several dissertations on the organs of generation in both sexes, which involved him in a prolonged and angry controversy with Swammerdam. His "Complete Works" were published at Leyden in 1677, and republished in 1686 and 1705. He died in Delft, Netherlands, Aug. 17, 1673.

Graaf Reinet (gräf rī'net), a town of Cape Colony, nearly girdled by the Sunday river; 185 miles N. of Port Elizabeth. Founded in 1784, it still preserves the quaint and simple characteristics of the old Dutch town; and with its vineyards, orchards, and gardens, in contrast to the burning karroo plains that encircle it, it has been well called "the gem of the desert." The streets are wide, with rows of oak, orange, and other trees, and broad channels of running water; the houses white, with overhanging thatches and broad "stoeps." Behind it the Sneeuwberg Mountains rise to a height of 1,000 to 1,500 feet. Pop. (1904) 10,083.

Graafian Vesicles, in anatomy, numerous small globular transparent follicles found in the ovaries of mammals. Each follicle contains one ovum, which is expelled when it reaches maturity. Small at first, and deeply imbedded in the ovary, they gradually approach the surface, and finally burst and discharge the ovum.

Grabbe, Christian Dietrich (gräb'be), a German dramatic poet; born in Detmold, Dec. 11, 1801. Developing from an unhappy boy to a man of brilliant powers and ripe scholarship, his incurable passion for drink spoiled his married life and his fortunes, though Heine, Tieck, and others persuaded him to spasmodic reform; he was successively lawyer, actor, and soldier. Yet he won a place in German drama second only to Goethe and Schiller. His plays are striking and original in conception, and commanding in execution. The impression they leave is of an uncontrolled, discordant, and unrestful genius. "Hannibal," "Don Juan," and "Faust," the fragment entitled "Marius and Sulla," and "The Hermann Battle," exemplify these conditions in a marked degree. He died in Detmold, Sept. 12, 1836.

Grabovski, Michael (gräb-ov′skē), a polish novelist, born in Volhynia, in 1805. While still a student at Warsaw, he won a literary reputation in the war of the romantic on the then dominant classical school. "Thoughts on Polish Literature" and "Melodies from the Ukraine" were his first noteworthy volumes; but the revolution of 1830 interrupted his literary career for nearly 10 years, when he completed "Criticism and Literature." Two historical novels, one based on a tragic episode in the Ukraine, and the other on a peasant outbreak in the same region, entitled respectively "The Koliszezysna and the Steppe Dwellers" and "The Storm in the Steppes," are fine examples of Polish literature. An epoch-making work is his "The Old and the New Ukraine." He died in Warsaw, Nov. 18, 1863.

Gracchus, Caius Sempronius (grak′-us), a Roman politician, younger brother of Tiberius Gracchus, and like him a reformer. The patricians artfully proposed measures more popular than those which he brought forward, and turned the popular feeling away from him, when they commenced the repeal of all the reforms he had effected. On his opposing this, they raised a faction fight, and massacred thousands of his adherents in the streets and in the prisons. He had himself put to death by his own slave, that he might not fall into their hands, in 121 B. C.

Gracchus, Tiberius Sempronius, a Roman politician, son of Tiberius Sempronius Gracchus and Cornelia, daughter of Scipio Africanus Major; born about 168 B. C. He was educated with great care by his mother, his father having died while he was very young. He was already a distinguished soldier when in 137 he served as quæstor to the army of the consul Mancinus in Spain, where the remembrance of his father's honor, after 40 years, enabled him to gain better terms for the 20,000 Roman soldiers who lay at the mercy of the Numantines. But the peace was repudiated at Rome, and Mancinus was stripped naked and sent back to the Numantines. The hopeless poverty in which thousands of the Roman citizens were sunk now began to weigh on the mind of Gracchus, and ere long he plunged into an agitation for reform. Elected tribune of the people in 133, he endeavored to reimpose the agrarian law of Licinius Stolo, and after violent opposition on the part of the aristocratic party, who had bribed his colleague M. Octavius Cæcina, he succeeded in passing a bill to that effect. Tiberius Gracchus, his brother Caius, and his father-in-law Appius Claudius were appointed triumvirs to enforce its provisions. Meantime Attalus, King of Pergamus, died, and bequeathed all his wealth to the Roman people. Gracchus proposed that this should be divided among the poor, to enable them to procure agricultural implements and to stock their newly-acquired farms. It is said that he also intended to extend the franchise, and to receive Italian allies as Roman citizens. But fortune turned against the good tribune. He was accused of having violated the sacred character of the tribuneship by the deposition of Cæcina, and thousands of the fickle mob deserted their champion and benefactor. The selfish and unscrupulous aristocrats formed a ring for his destruction, a bad eminence in which belonged to P. Corn. Scipio Nasica. In the midst of the next election for the tribuneship, in 133 B. C., Tiberius Gracchus, with some hundreds of his friends, was murdered.

Grace, in ordinary language, a short prayer before or after meat; a blessing asked or thanks returned. In Greek mythology, one of three sister goddesses, called Aglaïa, Thalia, and Euphrosyne, daughters of Jupiter and the ocean nymph Eurynome, In their gift were grace, loveliness and favor. By the Greeks they were known as Charitês, and by the Romans as Gratiæ. They were the constant attendants of their beautiful mother, and were represented as three young and lovely virgins, with their hands joined. They presided over kindness and all good offices, and their worship was the same as that of the nine Muses, with whom they had a temple in common. They were generally represented in a nude state, to show that kindness ought to be performed with sincerity and candor. In music, a general term for ornamental notes or short passages, introduced as embellishments into vocal or instrumental music, not actually essential to its harmony or melody. In former times, in vocal music, the selection of graces was left to the judgment of the performer to a great extent, but in instrumental music numerous signs have, from time to time, been used, explanations of which will be found under their distinctive names. In our own time a reaction has taken place against the absurd embellishments indulged in by our forefathers, and it has become fashionable to sing and play music just as it is written. This is perhaps to be regretted, as those who are rendering music should carefully consider whether the writer wished ornaments to be excluded or omitted to write them under a belief that they would certainly be introduced in performance. In Scripture, the word grace with a religious meaning is used in many senses. The most distinctive are: (1) Unmerited favor (Rom. iii: 24, iv: 4). It is opposed to debt — *i. e.*, is not a payment of debt (Rom. iv: 4) — and to works — *i. e.*, it is not merited by good works (*ibid.*). It is called the grace of God (Titus ii: 11), and the grace of our Lord Jesus Christ (Acts xv: 11; II Cor. xiii: 14). By the "grace of God" is

meant His love for mankind, as evinced by sending His Son into the world to make atonement for sin and offer salvation through faith in His blood (Eph. xi: 7, 8; Acts xx.). "The grace of our Lord Jesus Christ" signifies His loving favor as evinced by His undertaking and carrying out this mission of mercy (II Cor. viii: 9). (2) The results of such favor; privilege, as of apostleship, etc. (Ephes. iii: 8; II Peter i: 10). (3) The transforming influence of the Spirit of God (Acts xviii: 21). (4) The results of such influence, spiritual and moral character, conduct, and conversation and attainments, etc., (II Cor. viii: 6; Col. iv: 6). In this sense the Christian is supposed to have many graces; as, for instance, the grace of liberality (II Cor. viii: 7). (5) Loving character, benevolence, suavity, sympathy. Used preëminently of Jesus. In this sense it is sometimes coupled with truth (John i: 14, 17).

In Church history, such doctrines as those relating to the decrees of God, predestination, freewill, and the operations of the Holy Spirit on the human conscience, are often called the doctrines of grace. A great contest arose on the subject in the 5th century, the antagonistic views being those of Pelagius and Celestius, who gave much prominence to the tenet of man's natural ability to do what is right (see PELAGIANISM: SEMIPELAGIANISM), and of Augustine, who, strongly holding the sovereignty of God, the natural depravity of man, and the spiritual inability thus resulting, attributed the salvation of the latter solely to Divine grace, with little of human coöperation. The controversy thus commenced went on with intermissions for some centuries. At the Reformation Luther held views essentially Augustinian, as did most of the other reformers. Calvin formulated them as one of his five points. In the next century the antagonistic system of Arminianism was also formulated and urged upon the Church. See ARMINIANISM. It leans in the direction of Pelagianism, but stops considerably short of that system in its extreme form. Day of grace, the time during which Divine grace is obtainable by one who seeks it in prayer; the period during which probation extends — *i. e.*, during which one is in this world. The expression "day of grace" does not occur in Scripture; it is regarded as the same in meaning with day of salvation in II Cor. vi: 2. This again is a quotation from Isa. xlix: 8. See also Heb. iv: 7, which is a quotation from Psa. xcv: 7, 8. Day of grace is the opposite of the day of wrath, Rom. ii: 5.

Grace, Days of, in commerce, a certain number of days immediately following the day, specified on the face of a bill or note, on which it becomes due. Till the expiry of these days payment is not necessary. In Great Britain the days of grace are three; in the United States they have been abolished generally in National bank operations.

Grace, William Gilbert, an English cricketer; born in Downend, near Bristol, England, July 18, 1848. He was fourth son of the village doctor; was a very distinguished cricketer by 1864; and soon was by far the foremost of cricketers, not merely playing in the great matches at home but making cricketing tours in Canada and the United States (1871), and Australia (1873). He studied medicine mainly at Bartholomew's Hospital (1875–1878), and took L. R. C. P. at Edinburgh in 1879, whereupon he settled in practice at Bristol — finding time also for many a brilliant exhibition of his favorite game. He received a testimonial of £1,400 in 1879, and in 1895, when he received one of over £5,000, he had scored a century 100 times. He published a book on "Cricket" in 1891. His four brothers all became doctors, and were all distinguished in the cricket field, especially George Frederick (1850–1880).

Gracilaria, a species of plants, order *Ceramiaceæ*. The *G. lichenoides* is the commercial Ceylon moss. It is nutritive, emollient, and demulcent, and may be employed in the form of a decoction or jelly as a food for children and invalids, and medicinally in pulmonary complaints, diarrhœa, etc. It is sometimes imported under the name of agar-agar; but *G. spinosa* has also been imported under the same name. Both species are largely used in the East for making nutritious jellies, for stiffening purposes, and for varnishing. *G. helminthocorton* is a Corsician moss. It has been used principally as a vermifuge, but its properties have been much overrated. *G. crassa*, or ki-tsai, is cooked with a soy or vinegar in China, and is also used by the Chinese ladies for giving a gloss to their hair.

Gradient, in heraldry, a term applied to the tortoise, as supposed to be walking. Also (1) The rate of ascent or descent in a railway or road; a grade; the degree of slope or inclination of the ground over which a railway, road, etc., passes; as, The gradient is 1 to 100; that is, the ground rises one foot in every 100 feet. (2) A part of a road, etc., which slopes upward or downward; a slope.

Gradient Post, in railroad engineering, a post placed by the side of the track, at a change of grade, carrying a board slanted to the slope, and indicating in figures the grade in feet per 100, or otherwise. Also a stake set in the ground and marked to indicate the proper height of an embankment or of road metal at that point.

Gradisca (grä-dis'kä), a town of Austria, on the Isonzo, 25 miles N.W. of Trieste. First fortified by the Venetians in 1478.

Gradisca, with its territory, came into the hands of Austria in 1511, and during the next century and a half figured frequently in the wars between Austria and Venice. In 1647 it became a principality of the empire, but lapsed to the imperial crown again in 1717, and in 1754 was united to Görz.

Gradual. (1) A service-book, containing the hymns or prayers to be sung by the choir, so called from certain short phrases after the epistle sung *in gradibus* (on the steps of the altar). (2) That part of the service of the mass in the Roman Catholic Church which immediately follows the epistle, and is sung as the deacon returns to the steps of the altar. Also, 15 psalms, from Ps. cxx. to Ps. cxxxiv. inclusive; so called because they were formerly chanted from the steps of the choir, more especially during Advent.

Graduation, the art of dividing into the necessary spaces the scales of mathematical, astronomical, and other philosophical instruments. Common graduation is simply effected by copying from a scale prepared by a higher process; original graduation is chiefly performed either by stepping or bisection. Stepping consists in ascertaining by repeated trial with finely-pointed spring-dividers — which are made, as it were, to proceed by successive steps — the size of the divisions required, their number being known, and then finally marking them. In bisection the beam compasses are used, an arc with a radius of nearly half the line being described from either end of the line, and the short distance betwen the arcs bisected with the aid of a magnifier and a fine pointer. The process is repeated, for each of the two halves thus obtained, till by subdivision the required graduation is obtained. Ordinary instruments are graduated by machines, most of which are based on the principle of that invented by Ramsden in 1766. In this there is a horizontal wheel, turning on a vertical axis, with a toothed edge which is advanced a certain amount (*e. g.*, 10′ of arc) by each revolution of the endless screw with which it gears. The screw is worked by a treadle, and the machine can be so adjusted that a movement of the treadle shall secure either the whole or any desired part of a revolution of the screw. A dividing engine was invented by Troughton, but it was exceedingly complicated. That of Simms, which was self-acting and threw itself out of gear when its work was done, takes a high place among mechanical inventions. The most accurate was that of Andrew Ross (1831). For fine graduation Froment invented a machine in which the object to be graduated was slowly and intermittingly pushed forward by a screw, while a fine steel or diamond point, working automatically, made a cut at each cessation of the feeding motion. He thus drew 25,000 lines marking equal intervals in the space of one inch, but the number has since been increased to 225,000 by Nobert.

Gradus ad Parnassum ("a step to Parnassus"), a dictionary of prosody used in English schools in making Latin and Greek verse. The best known is the Latin one by John Carey (1756–1826), teacher of the classics and author of school books, which was published in 1824.

Grady, in heraldry, a term used to express steps or degrees, and one battlement upon another; also called battled, embattled, or embattled grady.

Grady, Henry Woodfen, an American journalist; born in Athens, Ga., in 1851; was educated at the University of Georgia; served in the Confederate army during the latter part of the Civil War; became one of the staff of the Atlanta "Herald," and correspondent of the New York "Herald" in Georgia. His writings contributed much to the growth and prosperity of the "New South"; he was also one of the editors of the Atlanta "Constitution." Among Southern editors he was perhaps more widely known than any other. He died in Atlanta, Ga., Dec. 23, 1889.

Græfe, Karl Ferdinand von (grā′fe), a German surgeon; born in Warsaw, Russian Poland, in 1787. He was nominated Professor of Surgery and director of the surgical clinic in 1811; and became afterward surgeon-general of the army, and co-director of the Friedrich Wilhelm Institute and the Medical Surgical Academy. To him the science is indebted for the introduction of many new instruments and methods of operating. Among his works were: "Angiectasis" (1808); "Rules for the Amputation of Limbs" (1812); "Rhinoplastics" (1818); "Surgery and Treatment of the Eyes" (1820–1840); etc. He died in 1840. His son, Albrecht von Græfe (1828–1870), an eminent oculist, devoted himself more particularly to ophthalmology, and established in Berlin a private clinic and hospital for eye diseases, which became so well known as to be frequented by patients and students from all parts of the world. He was Professor of Ophthalmology from 1867.

Graetz, Heinrich (grets), a German-Hebrew theologian; born in Xions, Posen, Prussia, Oct. 31, 1817. He studied at Breslau, where in 1854 he became teacher in the Jewish seminary, and in 1870 also extraordinary professor in the university. He wrote commentaries on Ecclesiastes, Song of Solomon, Joel, the Psalms, and a work on "Gnosticism and Judaism"; but is remembered by his great "History of the Jews" (11 vols. 1853–1875; 4th ed. 1892). He died in Munich, Sept. 7, 1891.

Graf (gräf), a title of nobility, which in Germany corresponds to the title count.

The first mention of this particular grade of nobility occurs in the 5th century. There are two classes of grafs in Germany at the present time, the first forming a section of the highest and oldest nobility, and the second representing the higher order of the lower nobles.

Graf, Arturo, an Italian poet and critic; born of German parentage, in Athens, in 1848. His youth was spent in Rumania; he studied law at Naples; became a tutor at the University of Rome in 1874, and in 1882 Professor of Literature at Turin. "Poems," light in spirit and substance; "Medusa," a powerful but somewhat heavy tragic outburst, and some occasional effusions, speak well for his poetic talent. In prose he is a master when dealing with "The Origin of the Modern Drama," "Historical Literature and its Methods," and "The Legend of the Terrestrial Paradise."

Gräfenberg (grā′fen-berg), a village in the N. W. corner of Austrian Silesia, 50 miles N. of Olmütz. It is celebrated as the spot where the water-cure (see HYDROPATHY) was introduced in 1826 by Vincenz Priessnitz (1799–1851). It still is visited yearly by many persons.

Graffigny (grä-fē-nyē′), **Françoise d'Issembourg d'Happoncourt, Madame de,** a French epistolary writer; born in Nancy, France, Feb. 13, 1695. Married young but separating from her husband, she took refuge at Cirey with Madame du Châtelet and Voltaire. Her first appearance in literature was with the "Peruvian Letters," a palpable imitation of Montesquieu's "Persian Letters," but successful. A volume of her letters appeared posthumously under the title "The Private Life of Voltaire and Madame du Châtelet," a gossipy and trifling but very readable work. She died in Paris, Dec. 12, 1758.

Graffiti (gräf-fē′tē), a class of ancient inscriptions, of which several collections have been made. The graffito is a rude scribbling or scratching with a stylus, or other sharp instrument. See GRAFFITOLOGY.

Graffitology, a scientific study of the rough drawings and inscriptions (see GRAFFITI) found on walls and in public places of ancient cities, especially in Rome, These latter, which occur frequently in the Roman forum, and the temple of Antonius and Faustina, have been made a special study by Professor Orazio Marucchi, director of the Egyptian and Ethiopian Museum at the Vatican, and the Rev. Dr. B. F. Broderick, professor in the Roman Catholic Seminary at Hartford, Conn. These drawings have evidently been made by soldiers, slaves or citizens, very much as at the present day idle people deface monuments, walls of houses, etc., with pictures or phrases. One of this latter class of drawings, discovered by Professor Marucchi on the wall of a room in the soldiers' quarters in the house of Tiberius, appears to be a representation of the crucifixion, though it has been given various significations by those who have seen a reproduction of the picture. The study of these ancient relics is a most interesting one and throws new light on much of the everyday life of those far-off days.

Grafting, in carpentry, a scarfing or endwise attachment of one timber to another, as in attaching an extra length or false pile to one already driven. In nautical language, the tapering of the end of a rope, usually covered by weaving yarns around it. In surgery, the transplanting of a portion of skin to a denuded surface.

In husbandry, the act or process of inserting a shoot or scion taken from one tree or shrub in a vigorous stock of its own or a closely allied species, so as to cause them to unite and enable the graft to derive a larger supply of nutritive power than it could otherwise obtain. There are numerous methods of grafting. One is grafting by approach, or inarching, when two growing plants are united together, and after adhesion one is severed from its own stock and left to grow on the other. This kind of adhesion sometimes takes place naturally in trees growing close together. The usual method of grafting is by scions or slips, which are applied to the stock by a sloping surface, or are inserted into slits in it by cleft-grafting, or into perforations by wimble or peg-grafting. Sometimes several slips are placed in a circular manner around the inside of the bark of the stock, by crown grafting; or the bark of a portion of the stock is removed, and that of the scion is hollowed out, so as to be applied over it like the parts of a flute, hence called flute-grafting. Budding is practised by the removal of a bud from one plant, along with a portion of the bark and new wood, and applying it to another plant, in which a similar wound has been made. In whip grafting, or tongue grafting, the stock is cut obliquely across, and a slit or very narrow angular incision is made in its center downward across the cut surface, a similar deep incision being made in the scion upward at a corresponding angle, and a projecting tongue left, which, being inserted in the incision in the stock, they are fastened closely together. Splice grafting is performed by cutting the ends of both the stock and the scion across at such an angle that the oblique surfaces exactly fit each other and are fastened together. In saddle grafting the end of the stock is cut into the form of a wedge, and the mid-

dle of the scion cut away so as to rest exactly upon the stock. Grafting is usually performed between the woody parts of the plants, but herbaceous parts may also be united in this way. It is requisite that the growing parts be brought into apposition — the two albumens and the two libers. Union will only take place where the active processes of life are freely exercised. The graft and stock are secured together by means of clay, or a mixture of bees'-wax and tallow, or by bits of india-rubber.

Grafton, a town in Worcester co., Mass.; on the Boston and Albany and the New York, New Haven and Hartford railroads; 6 miles S. E. of Worcester. It contains several villages, high school, public library, and a National bank; manufactures cotton goods, emery, thread, shoes, soap, etc.; and had an assessed property valuation of over $2,000,000. Pop. (1890) 5,002; (1900) 4,869; (1910) 5,705.

Grafton, Augustus Henry Fitzroy, Duke of, an English statesman, a descendant of Charles II.; born Oct. 1, 1735. In 1757 he succeeded his grandfather, the second duke (see CHARLES II.). He first came to the front in political life in 1763 in the opposition to Bute, and in July, 1765, he took office as Secretary of State under Rockingham, but resigned in the following May. Two months later Pitt became premier and Earl of Chatham, making Grafton First Lord of the Treasury; but in consequence of Chatham's continued illness Grafton was compelled to take on his own shoulders the responsible duties of head of the government from September, 1767. He resigned in 1770, accepted the office of Lord Privy Seal under Lord North in 1771, and filled it till November, 1775. When the new Rockingham ministry was formed in March, 1782, Grafton took his old post as Lord Privy Seal, but resigned office 13 months later. He was the target at which JUNIUS (*q. v.*) shot some of his sharpest invectives. He died in Euston Hall, Suffolk, England, March 14, 1811.

Graham, the name of an illustrious Scottish family of Anglo-Norman origin, who settled in Scotland during the 12th century. A Sir William de Græme received from David I. the lands of Abercorn and Dalkeith, and extensive grants of estates were made to his descendants by William the Lion, Alexander II. and III., and by King Robert Bruce. The third earl of the family twice held the office of High Treasurer of Scotland, and was appointed Lord Chancellor in 1599. On resigning that office he was appointed Viceroy of Scotland for life. His grandson, the fifth earl and first Marquis of Montrose, is the glory of the House of Graham (see GRAHAM, JAMES). The fourth marquis was appointed High Admiral of Scotland in 1705 and President of the Council in 1706. He was a firm supporter of the union between England and Scotland, and was created Duke of Montrose in 1707. He held the office of Keeper of the Privy Seal under Queen Anne (1709–1713), was appointed Secretary of State for Scotland by George I. in 1717, and a second time Keeper of the Great Seal in Scotland. He was Chancellor of the University of Glasgow, and died in 1742. His grandson, the third duke, held in succession, under the ministry of William Pitt, the offices of one of the Lords of the Treasury, Paymaster of the Forces, one of the Commissioners of the Indian Board, Master of the Horse, Lord Justice-general of Scotland, President of the Board of Trade, and Joint Paymaster of the Forces. He was also, like his father, Chancellor of the University of Glasgow, and Lord-lieutenant of the counties of Stirling and Dumbarton, in which he had great influence. He died in 1836.

Graham, James, a Scottish military officer; born in 1612; fifth Earl and first Marquis of Montrose. When the Civil War began he took up arms with the Presbyterians, but later joined the king, who appointed him lieutenant-general in Scotland in 1644. He was victorious over the Covenanters at Tippermuir, Sept. 1, and at Aberdeen, Sept. 13, 1644, and again defeated them at Inverlochy, Feb. 2, at Auldearn, May 9, at Alford, July 2, and at Kilsyth, Aug. 15, 1645. He was finally overcome by David Leslie at Philiphough, Sept. 13, 1645, and was exiled from Scotland. Later he became a field-marshal in the army of the Emperor Ferdinand III. In 1650 while endeavoring to lead a Royalist force into Scotland he was captured and executed.

Graham, Sir James Robert George, an English statesman; born in Netherby, Cumberland, England, June 1, 1792. He was educated at Westminster and Queen's College, Cambridge. As private secretary to the British minister in Sicily in 1813, he had a hand in the negotiations with Murat at Naples. After his return for Carlisle as a Whig in 1826 he became a warm supporter of Catholic emancipation and a zealous advocate of the Reform Bill. Earl Grey thereupon offered him in 1830, the post of First Lord of the Admiralty, with a seat in the cabinet. But in 1834 he seceded from the government, disagreeing with his colleagues on the appropriation clause of the Irish Church Temporalities Act; and, going over to the Conservatives, became in 1841 Home Secretary under Sir Robert Peel. In 1844 he issued a warrant for opening the letters of Mazzini, and caused the information thus obtained to be communicated to the Austrian minister, an

act by which the ministry, and Graham in particular, incurred great obloquy. He also encountered great displeasure N. of the Tweed by his high-handed method of dealing with the Scottish Church during the troubles which ended in the Disruption and the formation of the Free Church. He gave Peel warm support in carrying the Corn Law Repeal Bill, and resigned office (1846) with his chief as soon as that measure was carried. On the death of Peel in 1850 he became leader of the Peelite party in the Lower House, and in December, 1852, took office in the Coalition Ministry as First Lord of the Admiralty. He retired from official life in February, 1855, and died in Netherby, Oct. 26, 1861.

Graham, John, Viscount Dundee, commonly known as CLAVERHOUSE, a Scottish soldier, eldest son of Sir William Graham, of Claverhouse; born, about 1650. He was educated at St. Andrews. He went abroad and entered the service of France and afterward of Holland, but returned to Scotland in 1677, where he was appointed captain of a troop of horse raised to enforce compliance with the establishment of Episcopacy. He distinguished himself by an unscrupulous zeal in this service. The Covenanters were driven to resistance, and a body of them defeated Claverhouse at Drumclog, June 1. On June 22, however, the Duke of Monmouth defeated the insurgents at Bothwell Brig, and Claverhouse was sent into the W. with absolute power. In 1682 he was appointed sheriff of Wigtonshire, and, assisted by his brother David, continued his persecutions. He was made a privy-councillor, and received the estate of Dudhope, with other honors from the king, and though on the accession of James his name was withdrawn from the privy-council it was soon restored. In 1686 he was made Brigadier-General, and afterward Major-General; and in 1688, after William had landed, he received from James in London the titles of Lord Graham of Claverhouse and Viscount Dundee. When the king fled he returned to Edinburgh, but finding the Covenanters in possession he retired to the N., followed by General Mackay. After making an attempt on Dundee, Claverhouse finally encountered and defeated Mackay in the Pass of Killiecrankie, July 17, 1689, but was killed in the battle.

Graham, R. Tomson. See WATSON, ROSAMOND MARRIOTT.

Graham, Thomas, a Scottish chemist; born in Glasgow, Scotland, Dec. 21, 1805. Having studied at Glasgow and Edinburgh, he became in 1830 Professor of Chemistry in Glasgow, and in 1837 he accepted the corresponding chair at University College, London. In 1855 he was appointed Master of the Mint, and resigned his professorship. His name is most closely associated with the subject of the molecular diffusion of gases. He wrote: "Absorption of Gases by Liquids"; "Absorption of Vapors by Liquids"; "Law of Diffusion of Gases"; "Diffusion of Liquids"; "Liquid Diffusion applied to Analysis"; "Liquid Transpiration in Relation to Chemical Composition"; "Molecular Mobility of Gases" "Elements of Chemistry," (1837); etc. He died in London, Sept. 16, 1869.

Grahame, James, a Scottish clergyman and poet; born in Glasgow, Scotland, April 22, 1765. The son of a prosperous lawyer, he went in 1784 to Edinburgh to study law, and, after qualifying as a writer to the "Signet," was admitted as an advocate in 1795. Finding law uncongenial, at 44 he took orders, and was successively curate of Shipton, in Gloucestershire and of Sedgefield, in the county of Durham, England, Ill-health compelled him to return to Scotland. Grahame's poetical works include "Mary, Queen of Scots" (1801), a dramatic poem; "The Sabbath" (1804); "British Georgics" (1804); "The Birds of Scotland" (1806); "Poems on the Abolition of the Slave-trade" (1810). His fame rests securely on his blank-verse poem, "The Sabbath." He died in Scotland, Sept. 14, 1811.

Grahame's Dyke, the Roman wall between the Clyde and the Forth, so named by the peasantry from the fact that a chief named Grahame was the first to scale it after the Romans left Britain.

Graham Island, or **Ferdinandea,** a volcanic island which in July, 1831, rose up in the Mediterranean, about 30 miles S. W. of Sciacca, in Sicily. It attained a height of 200 feet, with a circuit of 3 miles, but disappeared in August. It reappeared for a short time in 1863.

Graham's Land, an island of the Antarctic Ocean, discovered by Biscoe in 1832, between 65° and 67° S. lat. In front, toward the N., are a number of islets, called Biscoe's Chain.

Grahamstown, the capital of the E. province of Cape Colony; near the center of the maritime division of Albany, 1,728 feet above sea level, 106 miles N. E. of Port Elizabeth. It is the seat of two bishops —Anglican and Roman Catholic; and in its Anglican cathedral is a monument to Colonel Graham, after whom the city is named. Leather is manufactured, and among the institutions of the place are its museum, St. Andrew's College, a public library, a general hospital, and large barracks. Pop. (1904) 13,877.

Grail, a term properly applied to the legendary dish used at the Last Supper,

said to have been stolen by a servant of Pilate, used by him to wash his hands in before the multitude, afterward given to Joseph of Arimathea as a memorial of Christ, and finally used by Joseph to collect the blood which flowed from our Lord while hanging on the cross, "This," said He (Christ), "is the holy dish wherein sate the lamb on St. Kerthin's day" (Malory, "Morte Arthure," bk. xvii: ch. xx). The word (which is commonly qualified by the adjective san, saint, sayn, sant = holy) was afterward applied to the cup used at the Last Supper. According to one legend, the Holy Grail was brought by Joseph of Arimathea to England, where he settled at Glastonbury about A. D. 63. Finally it was transported to India, where it still remains. In A. D. 1101 the Crusaders, at the capture of Cæsarea, found what they believed to be the veritable Holy Grail, a dish made of a single large emerald. It is now preserved in the Cathedral of San Lorenzo, in Genoa. Another legend says that the holy vessel was brought from heaven by angels, and intrusted to the care of a body of knights, who guarded and watched it on the top of a high mountain. It was invisible to any one not perfectly pure. The search, or quest, for the Holy Grail after its loss or disappearance, formed the subject of numerous romances or poems, such as those of Arthur and the Knights of the Round Table.

Grain, in dyeing, a firm dye, or one applied thoroughly; in the wool, not in the web. In painting, a style of painting in imitation of the natural grains of wood, marble, etc. In weights, the unit of weight in the English system; in a pound avoirdupois are 7,000 grains, in a pound troy 5,760 grains; a grain is equal to .0647990 grammes. In skins, the hair side, in contradistinction to the flesh side.

Grain Coast, a former name for Liberia, Africa. See GUINEA COAST.

Grainer, in tanning (1) An infusion of pigeon's dung for giving flexibility to skins in the process of tanning. Also called bate. (2) A knife used by tanners for taking the hair off skins.

Grain Elevator, a building designed for the reception, storage and transshipment of wheat, corn and other cereals. It is a tall structure situated near wharf and railway facilities. In the middle front is a stationary tower flanked by movable towers running on a track so that they may be brought opposite the hatches of the grain vessel to be unloaded. Each tower has a large long double box called a "marine leg" through which runs an endless rubber belt provided with buckets. The leg is lowered into the hold, and the grain, which is shoveled toward it, flows into the buckets and is lifted to the top of the tower, where, as the buckets run over the pulley, it is discharged into a great receiver, from which it is drawn into a hopper, weighed, and then sent by other distributing legs to the storing bins, each having a capacity of 6,000 to 12,000 cubic feet, from which it may be transferred by spouts into cars or other conveyances. The upper floor contains the shafting and gearing, the power for which is transmitted by a wide belt from the engine below. By this machinery 30,000 bushels of grain an hour may be transferred from a ship to cars. There are elevators capable of storing 1,000,000 to 1,500,000 bushels of corn. The largest are erected at Chicago, Buffalo, Minneapolis, Duluth and Superior; at these two last points combined there is a total elevator capacity of about 50,000,000 bushels. The grain on being received at the elevator is examined and graded, all of the same quality being kept together. The farmer or merchant who brings it receives an acknowledgment for so much grain of such a quality; and the grain which is delivered from the elevator on his account is grain of that quality, and not the same as he brought. In New York, floating elevators are frequently employed to transfer the grain from barges to sea-going vessels direct.

The country grain elevator is usually a wooden structure, the first floor being framed, leaving clear space for cleaning machines and general working space. Above this the building is built up solid of plank laid flat one on top of the other to a height of about 35 feet and subdivided into bins holding from 1,000 to 5,000 bushels. The grain is received from the farmers over a scale, where it is weighed and by an appliance attached to the scale is dumped direct from the wagon into an underground pit through which runs a continuous belt, over a pulley, supplied with buckets attached to the belt; this belt runs to the top of the elevator, there running over another pulley, the grain discharging into a spout and being distributed into the different bins at the option of the operator. The power of the elevator now usually comes from a gasoline engine, and is distributed through the house by a system of shafting, pulleys and belts. The bottoms of most of the bins are hoppered, thus directing the flow of the grain therefrom to a common point; from which point its flow is directed by a spout into the pit, whence it is reëlevated by the buckets and belt to the front or track side of the house, and discharged into a small bin resting on a scale frame, where it is weighed and discharged therefrom direct into the car, by means of spout.

On arrival at a terminal, the grain is unloaded into a pit by means of a power

shovel or scoop; elevated from this pit the same as before; discharged at the top of the elevator into a scale, weighed and distributed into the various bins on exactly the same principal as in the country. In the terminal elevators there is always an elaborate system of cleaning and putting the grain in marketable shape, the machines for this purpose being on the first or working floor; and each time the grain is handled it has to be drawn into the pits, or in some cases direct to the cleaning machine and from thence to the pit, and re-elevated to the various bins. In shipping the same method is followed as at country stations, the grain being elevated to the track or vessel side of the elevator and transferred to cars or boats, as the case may be.

Graining, in leather manufacture (1) The process of rubbing leather with a board to raise the grain. The leather having been shaved to a thickness at the beam, and daubed, is hung up to dry, and is then folded, grain side in, and rubbed on the flesh side with a pommel or crippler to give the leather a granular appearance and render it supple. The hide is then extended and rubbed on the grain side. This is termed bruising. (2) A process for giving markings to the surface of leather to imitate the wrinkled appearance of morocco, hog-skin, and some other leathers. In painting, the imitation of the natural grain of wood by means of tools. Combs, brushes, rollers, and the corner of a folded rag are used in making the various patterns. In lithography, a mode of giving a certain texture to the face of a stone. One stone is laid on another with a quantity of sifted sand of a given fineness, and by a peculiar oscillation and gradual progression the surface is cut into a set of fine prominences more or less deep and distant, according to the character of the work to be placed on the stone.

Graining, *Leuciscus lancastriensis.* A fish found in England in the Mersey and its tributaries; it was recognized by Agassiz during a visit to England as having been found in some Swiss lakes. It is from 7 to 9 inches long, the upper parts pale drab, tinged with bluish-red, the under parts pale.

Graining Board, a board on which leather is spread while being grained by the crippler; also a board with a surface impressed or engraved with a pattern, in imitation of the natural grain of some kind of leather, and used to confer the same appearance on the other leather by pressure.

Graining Machine, a roller with a pattern surface representing the grain of wood, and used to transfer the pattern in paint to wood. In leather manufacture, a machine having rollers with raised, parallel, straight, or diagonal threads, which indent the goat or sheep skins and give the wrinkled appearance to morocco leather.

Graining Tool, hand tools, resembling combs, etc., for imitating in painting the lines which represent the growths of timber.

Grain Production. The following shows the production and value of the several grain crops in the United States in the calendar year 1909: Corn, 2,772,376,000 bushels, valued at $1,652,822,000; wheat, 737,189,000 bushels, valued at $730,046,000; oats, 1,007,353,000 bushels, valued at $408,174,000; barley, 170,284,000 bushels, valued at $93,971,000; rye, 32,239,000 bushels, valued at $23,809,000; and buckwheat, 17,438,000 bushels, valued at $12,188,000. Illinois ranked first in the production of corn, with 369,770,000 bushels, valued at $192,280,000; Minnesota, first in wheat, with 94,080,000 bushels, valued at $90,317,000; Illinois first in oats, with 159,064,000 bushels, valued at $60,444,000; Minnesota first in barley, with 31,600,000 bushels, valued at $14,852,000; Pennsylvania first in rye, with 5,508,000 bushels, valued at $4,406,000; and New York first in buckwheat, with 7,512,000 bushels, valued at $5,183,000. In the same year the production of flax-seed amounted to 25,856,000 bushels, valued at 39,466,000, in which industry North Dakota ranked first, with 14,229,000 bushels, valued at $22,340,000. See AGRICULTURE.

Grains. (1) A residuum of fiber and insoluble matters after infusion or decoction; as the grains of malt after the wort is decanted. (2) A bating solution of birds' dung, used in destroying the effect of lime, and in improving the flexibility of leather. (3) Pieces of sheet-metal, cast-iron, or tinned iron inserted into a mold for the purpose of supporting an accessory portion, such as a core, in position.

Grains of Paradise, or **Maleguetta Pepper,** an aromatic and extremely hot and pungent seed imported from Guinea. It is the produce of *Amomum Grana Paradisi,* a plant of the order *Zingiberaceæ.* By the natives these seeds are used as a spice or condiment; in Europe chiefly in veterinary practice, and fraudulently to increase the pungency of fermented and spirituous liquors. This drug is much used to give apparent strength to bad gin. The name Maleguetta pepper, or Guinea pepper is also given to other pungent seeds from the W. of Africa.

Grain Tin, crystalline tin ore; metallic tin smelted with charcoal; tin reduced from the loose grains of tin stone.

Grakle, the common name of many birds of the starling family *Sturnidæ,* all trop-

ical or subtropical. They have very much the habits of starlings, which some of them even excel in their imitative powers, and particularly in the imitation of human speech. This is remarkably the case with the mina birds or hills mynas (*Gracula javana*), common in India, which are easily tamed and taught. Many grakles feed on seeds and fruits while others are useful as destroyers of insects. In the United States the name grakle or grackle is applied to several species of the genera *Scolecophagus* and *Quiscalus*, omnivorous birds, also called "blackbirds" and "boat-tails."

Grallatores (-tō′rēz), wading birds; an order of birds, sub-class *Carniatæ*. They have long legs, a great portion of them often bare. This structure admirably fits them to wade, and that without having their feathers wet. They have often long necks and bills to reach the ground when wading. The toes are four, the hind one variable both in size and position. They have rudimentary webs, sometimes connecting the base of the tarsi, but not the extensive webs of the natatores; yet some of them swim and dive well. They mostly frequent marshy places, the sides of streams and lakes on the sea-shore, where they pick up worms and insects. The order may be divided into four tribes; *Macrodactyli, Cultrirostres, Longirostres,* and *Pressirostres;* they have been divided also into six families: (1) *Rallidæ* (rails), (2) *Scolopacidæ* (snipes), (3) *Ardelidæ* (herons), (4) *Charadriidæ* (plovers), (5), *Otitidæ* (bustards), and (6) *Gruidæ* (cranes). Representatives of the order have been found in the Cretaceous rocks, and a succession of others in the Tertiary.

Gram. See GRAMME.

Graminaceæ (-a′se-ē), or **Gramineæ** (-min′e-ē), an order of endogens, alliance glumales. It consists of evergreen herbs, a few of them reaching a great size and living for many years. The rhizoma is fibrous or bulbous; the stem, which is covered with a coat of oil, is cylindrical, generally fistular, closed at the joints but sometimes solid; the leaves are narrow and undivided; they are alternate with a split-sheath and a ligula or membranous expansion at the junction of the stalk and blade. The flowers, which are green, are in little spikes, called locustæ, arranged in racemes or panicles. Flowers formed of imbricated bracts, the outer ones called glumes, those within them paleæ, and the innermost ones scales. Glumes, two or five; paleæ, two, the outer one simple, the inner composed of two, united by their continuous margins, usually two-keeled; stamens generally three, rarely one; two, four, six, or more anthers, versatile; ovary, simple; styles, two or three, distinct, more rarely combined into one; seed, one, anatropal; generally undistinguishable from the membranous pericarp; albumen farinaceous. The order has a remote affinity to the palms (*Palmaceæ*), and a closer one to the sedges (*Cyperaceæ*). Grasses occur in all countries and in nearly all situations. There are 250 genera, and about 4,500 species. They constitute about one-twentieth, if not even one-sixteenth, of all known plants.

Grammar, the science which treats of the words of which language is composed, and of the laws by which it is governed. It is of two kinds, descriptive and comparative. Descriptive grammar classifies, arranges, and describes words as separate parts of speech, and notes the changes they undergo under certain conditions. Comparative grammar, which is based on the study of words, goes further; it analyzes and accounts for the changes they have undergone, and endeavors to trace them back to their origin; it thus deals with the growth of language.

Gramme (gram), the standard unit of French measures of weight, and is the weight of a cubic centimetre of distilled water at 0° Centigrade; the other weights have received names corresponding to the number of grammes they contain, or the number of times they are contained in a gramme. A gramme = 15.43248 grains troy, from which the equivalents in English measure for the other weights can easily be found; thus:

	Grains Troy.		Pounds Avoirdupois.
Centigramme =	.1543234	=	.0000220462
Decigramme =	1.543234	=	.000220462
GRAMME =	15.43234	=	.00220462
Decagramme =	154.3234	=	.0220462
Hectogramme =	1543.234	=	.220462
Kilogramme =	15432.34	=	2.20462
Myriagramme =	154323.4	=	22.0462
Quintal =	1543234	=	220.462

Gramme Atom, a quantity of an elementary substance, such that the number of grammes-weight is the same as the atomic number of the element — *e. g.*, 12 grammes of carbon (C = 12).

Gramme Centimeter, in physics, a measure of work on the C. G. S. system of units. It is nearly = 9.81×10^2 ergs. It is rather less than the kilerg.

Gramme Degree, in physics, a measure of heat. One gramme degree Centigrade is = 4.2×10^7 ergs = 42,000,000 ergs.

Gramme Equivalent, a number of grammes-weight of a substance, elementary or compound, equal numerically to the quantity of that substance which is chemically equivalent to unit weight of hydrogen — *e. g.*, 8 grammes of oxygen, 9 grammes of water.

Gramme Molecule, a quantity of a substance, elementary or compound, such that the number of grammes and the molecular

weight are numerically the same — *e. g.*, 32 grammes of oxygen ($O_2 = 32$), 18 grammes of water ($H_2O = 18$).

Grammichele (gräm-mē-kā'le), a town of Sicily, 33 miles S. W. of Catania, on a mountain ridge, 1,768 feet above sea-level. Beautiful marbles are produced in the neighborhood. It was founded in 1693 in place of the neighboring town of Ochiolà, destroyed by an earthquake. Pop. (1901) 15,017.

Grammont (grä-môn'), the name of an illustrious French family, the best known of whom are: GABRIEL, a cardinal and diplomatist, in the time of Louis XII. and Francis I.; died in 1534. ANTHONY, Duc de Grammont, marshal of France, and viceroy of Navarre, author of "Memoirs," died in 1678, ARMAND, son of the latter, and Comte de Guiche, whose "Memoirs" also exist, 1638–1674; PHILIBERT, Comte de Grammont, son of Anthony, known by his memoirs, written by his brother-in-law Anthony, Comte Hamilton, died in 1720; ANTHONY, Duc de Grammont, a French marshal and ambassador, known as Comte de Guiche, 1671–1725; LOUIS, Duc de Grammont, lost the battle of Dettingen, and was killed at Fontenoy, 1745. The last duke was ANTOINE AGENOR ALFRED, born Aug. 14, 1819; Ambassador to Austria and Minister of Foreign Affairs; died Jan. 18, 1880.

COMTE DE GRAMMONT.

Grammontians, Grandmontines, or **Grandimontains,** a monastic order founded in A. D. 1073, with the sanction of Pope Gregory VII., by Stephen of Thiers, a nobleman of Auvergne, who is sometimes called Stephen de Muret. His rules enjoined poverty and obedience; abstinence from animal food, which was not allowed even to the sick; as also silence, and forbade conversation with females. The lay brethren were to manage the secular affairs of the monastery while their clerical associates devoted themselves exclusively to spiritual contemplation. The reputation of the order remained high during the 11th and 12th centuries. Ultimately, however, variance arose between the clerical and lay brethren, and the rigor of the rules was modified, both courses tending to lower the reputation of the order in the Christian world.

Grampians, a mountain range in Scotland. They commence in W. Scotland from the extremity of the lowest arm of the Frith of Clyde, between the counties of Argyle and Dunbarton, and running N., sweep round in a deep semicircle to the E., till they nearly impinge on the German Ocean, in the county of Kincardine. Before reaching this terminus, a branch is thrown off, which, trending in a N. W. direction, forms a lesser curve, which, passing through Aberdeen, Banff, and Elgin, is finally lost on the skirts of Inverness-shire. In this extended course it sends up several lofty peaks that form the highest eminences in Scotland. Of these the most important are Ben Lomond, Ben Ledi, Ben More, Ben Lawer, and Ben Vorlich. Also, the name of a mountain chain in the colony of Victoria, South Australia, whose highest point is Mount William, which is 4,500 feet above the level of the sea.

Grampus (*Phocæna Orca*), an animal of the cetacean order, closely allied to the porpoise to which genus it is often referred. It is one of the largest of the dolphin family, attaining 20 to 25 feet in length and 4 feet in diameter at its greatest thickness. It tapers both to the head and tail, being much more elongated toward the latter. The head is round, the muzzle truncated, the upper jaw projecting slightly over the lower. Its teeth are large, conical, slightly curved behind, 11 on each side of the upper and under jaw. Its dorsal fin is four feet in height, is curved behind, and terminates in a point. The pectoral fins are broad at the base and rounded at the extremities. The body is of a brilliant black color above and pure white below. An irregular black patch extends from the sides of the tail toward the flanks. There is a white patch above the eye. It is very voracious, preying on small cetaceans, etc., and it even attacks whales in troops. It also preys on salmon and pursues them up the mouths of rivers.

Gran, a royal free-town of Hungary, on the Danube, here crossed by a bridge of boats, 25 miles N. W. of Pest, and opposite the mouth of the Gran river. The town is the see of the primate of Hungary, and its great domed cathedral (1821–1856), on the castle hill, reveals in its magnificent proportions St. Peter's at Rome. The palace of the prince-archbishop, who is primate of Hungary, is the chief of many buildings in connection with the cathedral. The warm mineral springs of Gran have also some fame. Gran was the cradle of Christianity in Hungary; here St. Stephen, the first king, was born in 979, and baptized and crowned in 1000. In the next two centuries it be-

came the greatest commercial town in the kingdom. Pop. (1900) 17,909.

Granada, an ancient kingdom, and one of the old provinces in Southern Spain, bounded by by Andalusia, Murcia, and the Mediterranean. It is now divided into the provinces of Granada, Almeria, and Malaga, having a total area of 11,100 square miles and pop. (1900) of 1,363,462. The surface is mountainous and picturesque in a high degree. The mountain ranges, the chief of which are Sierra Nevada, the Sierra de Ronda, and the Alpujarras, run parallel with the coast. The principal rivers are the Almanzora, Almeria, Genil, Guadalhorce, and Guadiaro. The province is on the whole fruitful and highly cultivated. The mountains are rich in silver, copper, lead, and iron; and many of the inhabitants are engaged in mining and smelting. Saline and mineral springs abound. Granada was part of the Roman province of Boetica; but after the Arab invasion it formed an independent Moorish kingdom. For a time it was exceedingly wealthy, having developed great agricultural and commercial resources. It was the last possession of the Moors in Spain, and was conquered by Ferdinand and Isabella in 1492.

Granada, city and capital of the above province, was the ancient metropolis of the Moors in Spain, and stands on the Genil, 120 miles from Seville. The town exhibits the form of a half-moon, its streets rising above each other, with a number of turrets and gilded cupolas, the whole crowned by the Alhambra, or palace of the ancient Moorish kings, and in the background the Sierra de Nevada, covered with perpetual snow. It is built on two adjacent hills, and divided into four quarters. The Darro river runs between the two hills and traverses the town, after which it falls into the larger stream of the Genil, which flows outside the walls. The principal buildings are the cathedral, the archbishop's palace, the mansion occupied by the captain-general of the province, the university, and several hospitals; but the grand ornament of Granada is the Alhambra, the wonder of Arabian architecture. Though now, like the town, in a state of decay, its remains sufficiently evince its original splendor. It commands a beautiful prospect; but a still finer is afforded by another Moorish palace, called the "Generaliffe," built on the opposite hill, and the retreat of the court during the heats of summer. Pop. (1900) 75,900.

Granada (gra-nä′dä), a department and city of Nicaragua. The department, lying between the Pacific and Lakes Nicaragua and Managua has an area of nearly 2,600 square miles; is mostly a level savannah, but contains the volcano of Masaya and the Mombacho peak (4,500 feet). The city is on the N. W. side of Lake Nicaragua, and is connected with Managua by rail. Founded in 1522, it was formerly the chief town of the republic, but has suffered greatly from the civil wars; it is still, however, an important trading center. Pop. 35,000.

Granadilla, the West Indian name for the fruits of various species of *Passiflora,* a genus of the passion-flower family. Some species have been introduced into Europe, chiefly for their flowers, the chief being the purple-fruited *P. edulis;* the water lemon, *P. laurifolia;* the flesh-colored granadilla, and the *P. quadrangularis,* the most valuable for cultivation in Great Britain.

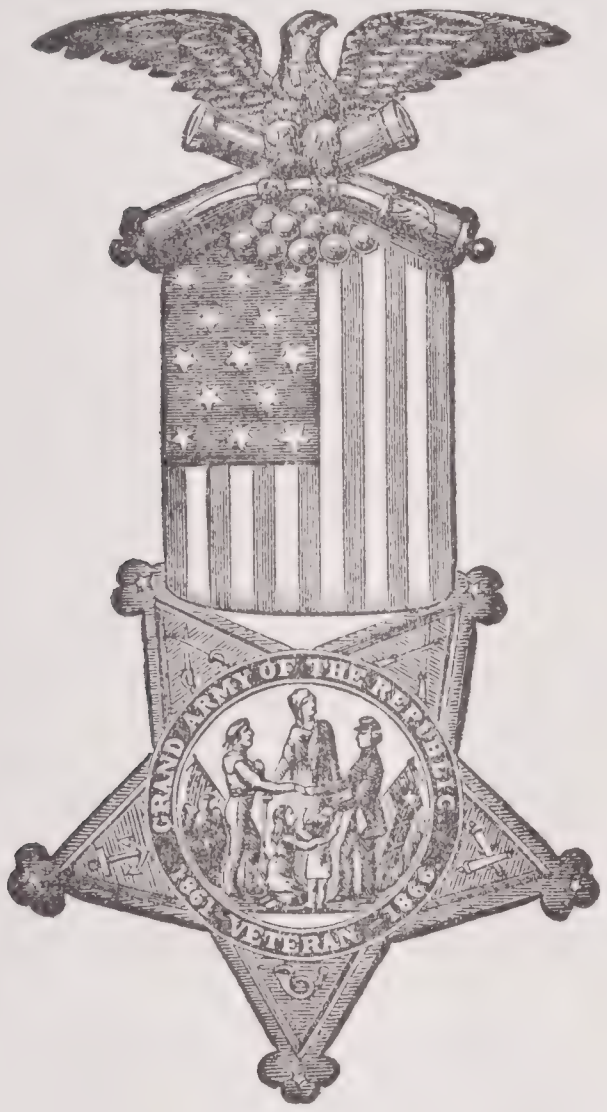
Grana-moluccana (-kā′nä), in pharmacy, the seeds of *Croton tiglium* and *C. pavana;* two euphorbiaceous trees from the East Indies, the oil of which is acrid and blisters the skin.

Granary of Europe, the island of Sicily; so named by the ancients on account of its productiveness.

Granby, John Manners, Marquis of, an English military officer; the eldest son of the 3d Duke of Rutland; born Jan. 2, 1721. He entered the army, and soon after attaining the rank of lieutenant-general (1759) was sent to Germany as second in command, under Lord George Sackville, of the British troops coöperating with the King of Prussia. After the battle of Minden he was appointed commander-in-chief of the British troops, and held that post during the remainder of the Seven Years' War. After the peace of 1763 he was constituted master-general of the ordnance, and in 1766 commander-in-chief of the army. He died in Scarborough, Oct. 19, 1770.

Gran Chaco (grän chä′kō), an extensive central tract of South America, extending from the S. tropic to 29° S. lat., and bounded on the E. by the Paraguay and Paraná, and on the W. by the Argentine provinces of Santiago del Estero and Salta; area, about 180,000 square miles. The portion S. of the Pilcomayo belongs to Argentinia, and the remaining third to Paraguay; but the possession of the upper section of the Pilcomayo is disputed by Bolivia. The country rises gradually from the Paraná toward the N. W. as far as 25° 40′ S. lat., when it dips to the valley of the San Francisco — part of a great depression extending through Bolivia nearly to the frontier of Peru, and subject to annual inundations. The Chaco is watered principally by two long, narrow, and tortuous streams, the Bermejo and the Pilcomayo, flowing S. E. in courses generally parallel, and about 180 miles distant from each other. The bed of the Bermejo oscillates backward and forward, and in 1870–1872 the river opened up a new channel

(known as the Teuco) for nearly 200 miles. The most N. part of the Chaco is an extremely arid zone, but the banks of the upper Pilcomayo are fertile and its sands auriferous, while S. of the Bermejo the primeval forest extends into Salta. Much of the region is of modern alluvial formation and exceedingly fertile. Since 1537,

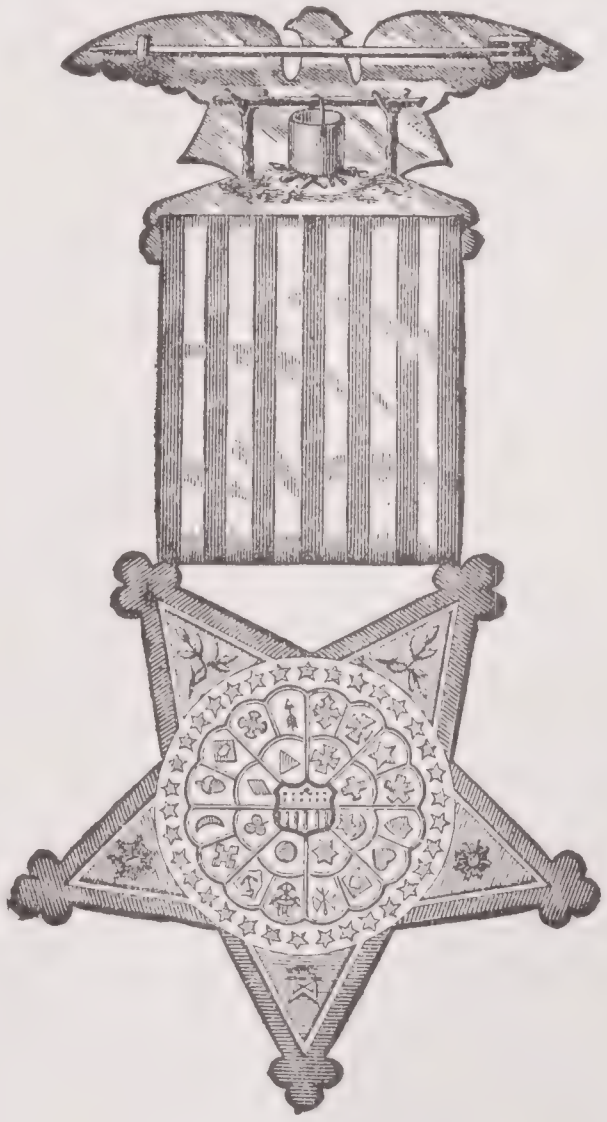


BADGE OF THE G. A. R. OBVERSE.

when the first explorer, Captain Juan de Ayolas, marched with 250 men into the wilderness from which none ever returned, numerous expeditions have been sent out from the surrounding countries; but the savage tribes, swamps, lagoons, and floods defeated all early attempts to open up the country. In 1884 garrisons were established along the Bermejo, and since 1885 permanent settlements have been made. Already there are many agricultural colonies and small towns along the Paraguay, connected by rail and telegraph; the Bermejo lands, on both banks for 400 miles from its mouth, have been conceded by the Argentine government for various enterprises; thousands of hands are employed in the timber trade, and steam sawmills are in operation; cattle raising and farming are carried on, and from the sugar-cane refined sugar and rum are manufactured. Concessions also have been granted for railways from Corrientes to the Bolivian frontier.

Grand, Sarah, the pseudonym of the English novelist, FRANCES ELIZABETH (CLARKE) MCFALL; born in Ireland in 1862. She married a British naval officer and traveled widely. "The Heavenly Twins" (1893) made her widely known. "The Beth Book" (1897) and "Babs the Impossible" (1900) are among her other works of fiction. She lectured in the United States in 1901.

Grand Army of the Republic, a patriotic organization in the United States composed of the National veterans of the Civil War. It was organized in Decatur, Ill., April 6, 1866, by Dr. B. F. Stephenson, of Springfield, formerly surgeon of the 14th Illinois Infantry. The establishment of Post 1 in Decatur was soon followed by Post 2 in Springfield, and in a few months other posts sprang up in Illinois, Indiana, Wisconsin, Iowa, Missouri, and other States. The first National Convention was held in Indianapolis, Ind., Nov. 20, 1866,



BADGE OF THE G. A. R. REVERSE.

with delegates from 10 States and the District of Columbia. Gen. Stephen A. Hurlbut, of Illinois, was chosen commander-in-chief and Dr. B. F. Stephenson, adjutant-general. The next National Convention was held in Philadelphia, Pa., Jan. 15, 1868, when it was enacted that annual sessions should be held. The main purpose of the Grand Army of the Republic and the

qualifications of its members are given in the sixth rule of the organization, which is as follows: "To maintain true allegiance to the United States of America, based on a paramount respect for, and fidelity to, its Constitution and laws, to discountenance whatever tends to weaken loyalty, incites to insurrection, treason, or rebellion, or in any manner impairs the efficiency and permanency of our free institutions; and to encourage the spread of universal liberty, equal rights, and justice to all men. Soldiers and sailors of the United States army, navy, or marine corps, who served between April 12, 1861, and April 9, 1865, in the war for the suppression of the rebellion, and those having been honorably discharged therefrom after such service, and of such State regiments as were called into active service and subject to the orders of the United States general officers between the dates mentioned, shall be eligible to membership in the Grand Army of the Republic. No person shall be eligible to membership who has at any time borne arms against the United States." On Jan. 1, 1909, there were 5,811 Grand Army posts; 44 departments; and 220,600 members.

Grand Canal, the principal canal in Venice. It runs through the city in a zigzag course and forms the main thoroughfare.

Grand Cañon (kan'yon), a gorge through which the Colorado river flows in Arizona; 65 miles from Flagstaff. It is one of the natural wonders with which that country abounds. The cañon is a gorge 217 miles long, or with the addition of Marble Cañon, connected with it, 286 miles. It is from 9 to 13 miles wide and 6,300 feet below the level of the plateau. This depth is maintained for about 50 miles and surpasses that of any other cañon in the world.

Grand-Carteret, John (gron-kär-terā'), a French journalist; born in Paris, about 1850. He is of Swiss origin, and first distinguished himself in French journalism through the accuracy and acuteness with which he treated German themes. Of late years he has made important studies of life and manners in Europe. "Character and Caricature in Germany, Austria, and Switzerland," "France, Judged by a German," "Woman and Germany," and "J. J. Rousseau, Judged by a Frenchman of Today," are among his many successes.

Grand Coutumier (kö-tü-myā') **of Normandy,** a collection of ancient laws or customs of the Duchy of Normandy, in use in England during the reigns of the early Norman sovereigns, and which still form the basis of the laws of the Channel Isles, which formerly belonged to that duchy. It is supposed to have been compiled subsequently to the reign of Richard I.

Grandees, a class of nobility in the kingdom of Castile, in which the members of the royal family were included. Their honors were hereditary; they held lands from the crown on the tenure of military service, were exempted from taxation, could not be summoned before any civil or criminal judge without a special warrant from the king, and could leave the kingdom, and even enter the service of a foreign prince at war with Castile, without incurring the penalties of treason. Under Ferdinand and Isabella they were deprived of most of their peculiar privileges; and Charles V. converted them from an independent feudal nobility into a dependent court nobility. Under Joseph Bonaparte their dignities and privileges were entirely abolished; but they were partially regranted at the subsequent restoration. Grandees are still members of the Spanish senate in their own right.

Grand Duke, a title applied to members of the imperial family of Russia, and also to the sovereigns of certain German states, who are considered as holding a position between duke and king. Before the establishment of the Italian kingdom under Victor Emmanuel, in 1861, there was a grand-duke of Tuscany.

Grand Forks, a city and county-seat of Grand Forks co., N. D.; on the Red River of the North and the Great Northern and the Northern Pacific railroads; 25 miles N. W. of Crookston. It is the seat of the University of North Dakota, St. Bernard's Academy, Northwestern College of Commerce and Grand Forks College; and contains a high school, 2 National banks, and daily and weekly newspapers. There are flour and lumber mills, large agricultural and lumbering industries, and an assessed property valuation of over $2,000,000. Pop. (1900) 7,652; (1910) 12,478.

Grand Gulf, a locality in Mississippi, on the Mississippi river, S. of Vicksburg. The Confederate batteries at this place were attacked by the forces under Farragut, March 31, 1863, and frequent shelling and bombarding occurred from that time until May 3, when the place surrendered to the land and naval forces under Grant and Porter.

Grand Haven, a city and county-seat of Ottawa co., Mich.; on Lake Michigan, at the mouth of Grand river, and on the Detroit, Grand Haven, and Milwaukee, and the Chicago and West Michigan railroads; 110 miles N. E. of Chicago. It has an excellent harbor and steamboat connection with the principal lake ports, and carries

on a large trade in lumber, flour, leather, etc. The city has electric lights, street railroads, a public library, a National bank, and several newspapers; manufactures refrigerators, furniture, brass novelties, matches, pails, tubs, etc.; and has an assessed property valuation of about $1,500,000. Pop. (1900) 4,743; (1910) 5,856.

Grandimontains. See GRAMMONTIANS.

Grand Island, a city and county-seat of Hall co., Neb.; on the Platte river and the Union Pacific, St. Joseph and Grand Island, and the Burlington Route railroads; 154 miles W. of Omaha. It is the seat of the Nebraska Soldiers' and Sailors' Home, has a National bank, railroad, machine and car shops, meat-packing houses, beet sugar factories, etc., and an assessed property valuation of nearly $1,000,000. Pop. (1900) 7,554; (1910) 10,326.

Grand Jury, a body of men, consisting of not less than 12 nor more than 24, respectively, returned by the sheriff of the proper county, or by the marshal of the proper district, to whom indictments are preferred. The law requires that 24 citizens shall be summoned to serve on the grand jury; but in practice not more than 23 are sworn because of the inconvenience which else might arise of having 12, who are sufficient to find a true bill, opposed to the other 12 who might be against it.

Grand Larceny, the stealing of goods exceeding a certain value, varying in various States.

Grand Lodge, the State lodge of Freemasons, Odd Fellows, and other fraternal organizations. It is presided over by the grandmaster, and grants charters, dispensations, etc., and acts generally as the governing body of the order in the State. The officers of grand lodges are delegates from the various subordinate or local lodges.

Grand Master, a name applied during the Middle Ages to the chiefs of the various dominant orders of knighthood—as the Templars and the Hospitallers, the latter of whom were later termed the Knights of Malta. The grand master was, in a sort of way, the sovereign for life of the order which he commanded, and his word was law in all matters, whether concerning life or death.

Grandmontines. See GRAMMONTIANS.

Grand Prix de Rome, a prize given annually by the Academy of Fine Arts in Paris to the most successful competitor in painting, music, sculpture, etc. The winners of the prize become the charge of the government for four years and are sent to Rome to reside.

Grand Prix, Le (le gron prē), a race run at Longchamps, in France, by three-year-olds. It was established by Napoleon III., the prize being 20,000 francs. The race course is in the Bois de Boulogne and was first used in the time of Louis XVI. The Grand Prix is run on the Sunday of Ascot week.

Grand Rapids, a city of Michigan, the second city of the State in population and industry, a port of entry, and county-seat of Kent co. It is situated at the head of navigation on the Grand river, 32 miles from Lake Michigan, 60 miles N. W. of Lansing, the State capital, and 145 miles N. W. of Detroit. It covers an area of 17.5 square miles, and had a pop. by census (1910) of 112,571.

Streets, Buildings, Churches, Schools, etc.— The site of the city is one of much natural beauty. The Grand river, 900 feet wide, descends here 18 feet in a mile, forming the rapids that gave the city its name. The greater part of the city lies E. of the river, which is crossed by several municipal and railway bridges. The streets are regularly laid out, and with few exceptions run N. and S. or E. and W. A number of them, like Leonard, Bridge, and Fulton streets, and Wealthy avenue, are prolonged to the west side by means of bridges. Among the longest N. and S. thoroughfares are Fuller, East, Union, and Division streets. The total length of streets is about 300 miles, of which about 35 miles are paved, and 145 miles are improved but unpaved. Public parks and playgrounds cover 160 acres, John Ball park, on the western limits, being the largest. The most notable public buildings are the city hall, completed in 1888 at a cost of nearly $246,000, exclusive of site and furnishings; the Ryerson Library building, erected at a cost of $300,000 and donated to the city by Martin A. Ryerson; and the Federal building. There are 4 theaters, numerous hotels, and a number of handsome club houses, the finest being those of the Peninsular and Lakeside clubs. The Kent Country Club occupies extensive grounds in the N. E. part of the city. There are 110 churches, including 11 Roman Catholic, 30 Dutch Reformed, 6 German Lutheran, and 63 of various other Protestant denominations. The principal charitable institutions are the Union Benevolent Association, Butterworth and St. Mary's hospitals, the Aldrich Memorial, State Masonic, Children's, and Holland Benevolent homes; St. John's Orphan Asylum, Home for the Aged, and Rescue Home, besides a number of smaller institutions. There are 42 public schools, including 2 high schools, excellent manual training courses, evening schools, and kindergartens. The total enrollment in the public schools is about 16,000; the number of teachers, 425; and the annual expenditure about $600,000. The 36 private and parochial schools have about 6,000 pupils, and there are also 3 commer-

cial schools, a theological seminary, a medical and a veterinary college. The Ryerson Library, with its branches, has about 100,000 volumes. Connected with it is the Kent Scientific Museum. There are published in the city 3 daily papers, 10 weekly papers, and 8 trade journals and periodicals.

Industry, Commerce, and Transportation.—The situation of the city in a rich farming country and in the center of the famous fruit belt of western Michigan, its proximity to the forests of pine and hardwood, the extensive gypsum quarries in its neighborhood, the water-power furnished by the river rapids, the transportation facilities offered by river and lakes, and the numerous railroads entering it—all these have combined to make Grand Rapids an important commercial and manufacturing center. Foremost among its industries is the manufacture of furniture, which in 1904, the date of the last census, was carried on in 38 establishments, with $8,005,000 of capital and 6,654 wage-earners (exclusive of salaried officials and clerks), who received $3,240,000 in wages, used materials valued at $3,583,000, and turned out products valued at $9,409,000. In the same year the products of the flour and grist mills were valued at $2,371,000; of the foundries and machine shops, $1,265,000; lumber and planing mill products, $967,000; bread and other bakery products, $1,178,000. The following industries turned out products valued at between $400,000 and $800,000: boots and shoes, carriages and wagons, gypsum wall plaster, hosiery and knit goods, printing and publishing (exclusive of newspapers and periodicals), refrigerators, show cases, carved and turned wood, tobacco, cigars and cigarettes. Other important industries were: food preparations, brooms and brushes, coffins, coppersmithing and sheet iron working, electroplating and electrical machinery, hardware, gloves, photolithographing and photoengraving, paints, mirrors, etc. The growth of the manufacturing activity of Grand Rapids since 1880 is shown in the following table:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1880	355	$4,864,000	5,172	$1,895,000	$3,957,000	$7,405,000
1890	869	15,946,000	11,869	5,280,000	9,392,000	19,851,000
1900	824	23,434,000	14,361	5,905,000	12,349,000	24,824,000

The special Census of Manufactures for 1904 was confined to industries carried on under the factory system, to the exclusion of neighborhood industries and hand trades. Compared with the corresponding figures for 1900, the results are shown in the following table:

Grand Rapids

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1900	385	$22,732,000	12,892	$5,280,000	$11,149,000	$22,240,000
1904	389	25,916,000	15,709	7,393,000	14,572,000	31,033,000
Per cent. Increase	1.0	14.0	21.8	40.0	30.7	39.5

There is an important trade in pine and hardwood. Twice each year, in January and July, there is held a furniture exhibition that attracts manufacturers, buyers, and sellers from all parts of the country. There are 7 State and savings banks, 5 National banks, and 6 branch banks in the outlying districts. The National banks had in 1906 an aggregate capital of $2,300,000, surplus and profits amounting to $1,106,000, and total resources and liabilities $20,055,000. In the same year the clearing house transactions amounted to $115,041,000, against $105,856,000 in 1905.

Grand Rapids has excellent transportation facilities, being located on the Père Marquette, Michigan Central, Lake Shore and Michigan Southern, Grand Trunk, and Grand Rapids and Indiana railroads. There is a daily boat line to Lake Michigan. The street railroads have a length of 61 miles, and there are interurban lines to towns within a radius of over 30 miles, including Grand Haven, Holland, and Saugatuck, on the lake.

Administration and Public Interests.—The mayor, aldermen, clerk, treasurer, comptroller, marshal, and city attorney are elected biennially. The various judges are elected for terms ranging from two to four years, the 9 members of the board of education are elected for a term of three years, 3 being elected each year, and the library commissioners are elected for five years. The members of the various boards, such as public works, police, assessors, health, parks, etc., are appointed by the mayor. The annual expenditure approximates $2,000,000, and the bonded debt amounted in 1907 to $2,336,000. The water works owned by the city have a daily capacity of 28,000,000 gallons, the average amount distributed daily being over 12,400,000 gallons. The city also owns an electric light plant for municipal lighting, a bacteriological laboratory, an isolation hospital for contagious diseases, and cemeteries.

History and Population.—An Indian village was located at the rapids of the Grand river before the coming of the whites. During the eighteenth century Indian traders came here to purchase furs, and early in the nineteenth century the American Fur Company established here a trading post. In

1821 the United States purchased from the Indians all the lands in Michigan to the S. of the Grand river. In 1825 an Indian mission was established here, and in connection therewith a sawmill was erected near the junction of Indian creek and Grand river. In 1826 Louis Campau, an Indian trader, settled here. In 1833 a settlement was made by 60 persons coming from Herkimer, N. Y. In 1837 the first newspaper was published; in 1838 the village of Grand Rapids was incorporated; in 1845 the first bridge was built across the river at Bridge street; in 1850 Grand Rapids was made a city; in 1858 trains commenced running to Detroit; and in 1865 the first street railroad cars were started. The making of furniture by machinery began in 1847, and the exhibition of Grand Rapids furniture at the Centennial Exposition in Philadelphia in 1876 established the city's reputation as a producer of artistic furniture.

The population was 2,686 in 1850; 8,025 in 1860; 16,507 in 1870; 32,016 in 1880; 60,278 in 1890; 87,565 in 1900; 95,718 (State census) in 1904; and 99,794 (Fed. est.) in 1906. In 1900 the population consisted of 42,470 males and 45,095 females, including 604 negroes. The foreign born numbered 23,896, making 27.3 per cent. of the total population, the most numerous elements being 11,137 Dutch, 3,487 Canadians, and 3,253 Germans.

Grand Seignior (sēn′yer), a title formerly given to the Sultan of Turkey.

Grandville (gron-vēl′), the pseudonym of JEAN IGNACE ISIDORE GÉRARD, a French caricaturist; born in Nancy, Sept. 3, 1803. In 1828 he first attracted attention by a series of humorous sketches entitled "The Metamorphoses of the Day," in which men with animals' faces show forth the follies and foibles of human nature. This was followed by several similar series of satirical caricatures of social relations, as "Animal Sayings," "One Hundred Proverbs," and the "Animated Flowers." He also practised political caricature with great success, and contributed illustrations to fine editions of the "Fables" of La Fontaine, "Robinson Crusoe," and "Gulliver's Travels." Grandville died in Paris, March 17, 1847.

Granella, Victor. See TANGERMANN, WILHELM.

Grange. See HUSBANDRY, PATRONS OF.

Granger, James, an English writer; born in Shaston, Dorsetshire, in 1716; was educated at Christ Church, Oxford. He published a long popular "Biographical History of England" in 1769, which was adapted to a catalogue of engraved British heads, and insisted much on the utility of a collection of engraved portraits. His advice led to extraordinary zeal in collecting portraits, and "grangerized copies" became the name for works embellished with engravings gathered from all quarters. He died in Shiplake, Oxfordshire, April 4, 1776.

Granicus (gra-nī′kus), a river of Bithynia, famous for a battle fought on its banks between the troops of Alexander the Great and those of Darius, 334 B.C., when 600,000 Persians were defeated by 30,000 Macedonians.

Granite, an unstratified rock, normally consisting of three simple minerals, felspar, quartz, and mica, or, in Dana's nomenclature, of orthoclase, quartz, and mica. For a long time the universally accepted view, which is still the prevalent one, was that it is an "igneous" rock of a "plutonic" type. The difficulty has, however, to be encountered that it is not seen in process of formation on the earth's surface. This has been met by the hypothesis that it originates beneath the surface and under high pressure, produced in most cases by earth, but in some instances by a weight of incumbent water. Like surface volcanic rocks it has been fused and afterward cooled; but it does not, like them, comprehend tuffs and breccias, etc., but assumes a crystalline texture, destitute of pores or cellular cavities to which gases entangled in lava or any such rock give rise. It is in favor of its igneous origin that it has in many places broken through ordinary sedimentary or metamorphic strata, sending veins through them in various directions. It rarely, however, overtops or caps them, as if coming up molten through a crater it had overflowed them above. Hence the term proposed for it—"underlying"—to distinguish it from the volcanic rocks, called "overlying" rocks. Some geologists consider it not an "igneous" or "plutonic," but a metamorphic rock, more altered than gneiss, which agrees with it in composition, but in which stratification has not been obliterated. The two views are not necessarily antagonistic; some granites may have the one origin and others the other. It is of all ages, some granite in the Alps having broken up the strata during Tertiary times. Granite incloses fluid cavities, having in them water, containing chlorides of potassium and sodium, with sulphates of potash, soda, and lime.

Granite often constitutes the axis of high mountain chains; the Sinaitic range has an axis of granite. Granite hills have a peculiar rounded form, with a scanty vegetation. They are easily distinguishable from the flat-topped, precipice-flanked basaltic hills. Von Buch considers that granitic mountains so much tend to be portions of a sphere that he looks upon them as ellipsoidal bubbles, which were forced upward in only a partially fluid state; then, when the upper dome-shaped surface contracted, many granitic blocks were formed. Granite is of

much economic value as a building stone. The production of granite in the United States in 1908 was valued at $18,420,080. The leading States in its production were Maine, Massachusetts, Vermont, California, and Wisconsin.

Granite State, the popular name of New Hampshire. Fine building granite is quarried at many points, notably at Plymouth, Concord, Milford, and Pelham.

Gran Sasso d'Italia (grän säs′sō dē-tä′lē-ä), "Great Rock of Italy," also called Monte Corno, a mountain in Italy, on the borders of the Abruzzi, between Teramo and Aquila. It is the highest summit of the Apennines, having an elevation of 9,574 feet.

Granson, or **Grandson** (gron-sôn′), a village in the canton of Vaud, Switzerland, on the Lake of Neuchâtel, 21 miles S. W. of Neuchâtel. Here March 3, 1476, the Swiss defeated the Burgundians under Charles the Bold.

Grant, the conveyance in writing of such things as cannot be passed or conveyed by word only, as lands, reversions, rents, etc., or made by such persons as cannot give but by deed.

Grant, the name of a Scotch family, of Norman extraction, introduced into Great Britain at the Conquest. Occasionally it appears in parts of England; but by the middle of the thirteenth century it had established itself in the N. of Scotland—Laurence le Grant holding the office of sheriff of Inverness in 1263. He and his descendants acquired large territories in the great Caledonian Glen, and also in Strathspey, Freuchie, now Castle Grant, near Grantown, becoming their principal barony and residence. The sixth laird of Freuchie was knighted by King James VI., and his grandson had his lands erected into the regality of Grant—whence their designation since. Sir Ludovick Grant, fourth laird of Grant, married as his second wife, Lady Margaret Ogilvie, daughter of James, fifth Earl of Findlater and Seafield, and, through this marriage, their grandson succeeded in 1811 to the earldom of Seafield, assuming the surname of Ogilvie in addition to that of Grant. Through another marriage, a younger brother of the fourth laird of Grant succeeded to the estates of the Colquhouns of Luss, and, assuming the surname of Colquhoun, became the ancestor of the present family of that name.

Grant, Sir Alexander, a Scotch educator; born in New York, Sept. 13, 1826; educated at Harrow and Balliol College, Oxford; graduated B. A. in 1848; and was elected to an Oriel fellowship. Here he edited the "Ethics" of Aristotle (1857). He succeeded as baronet in 1856, was appointed inspector of schools at Madras in 1858, and become Professor of History in Elphinstone College there; then its principal; and afterward vice-chancellor of Elgin College, Bombay. On the death of Sir David Brewster he was in 1868 chosen as principal of the University of Edinburgh. His "Story of the University of Edinburgh" (1884) was published in connection with the latter event. He died in Edinburgh, Nov. 30, 1884.

Grant, Anne, a Scotch author; born in Glasgow, Feb. 21, 1755. She was the daughter of a British officer, Duncan McVicar, who became barrack-master of Fort Augustus. She married in 1779 the Rev. James Grant, formerly chaplain of the fort, minister of Laggan. Left a widow in destitute circumstances in 1801, Mrs. Grant published by subscription a volume of "Poems" (1803), which were well received; "Letters from the Mountains" (1806), a highly popular work; "Memoirs of an American Lady" (1808); and "Essays on the Superstitions of the Highlanders of Scotland" (1811). She died in Edinburgh, Nov. 7, 1838.

Grant, George Monroe, a Canadian author; born in Stellarton, Pictou co., Nova Scotia, Dec. 22, 1835. He received his education in his native province, and subsequently won academic distinction in the University of Glasgow, Scotland. On his return to Nova Scotia he spent some time as a missionary in the Maritime Provinces; became pastor of St. Matthew's Church, Halifax; and in 1877 accepted the principalship of Queen's University. Besides contributions to periodical literature his works include: "Ocean to Ocean" (1872), a diary of a tour across the American continent; "Picturesque Canada" (1884), a work on the scenery, industries, and social life of Canada. He died May 10, 1902.

Grant, Sir Francis, a Scotch artist; born in Edinburgh, Jan. 18, 1803; educated at Harrow and the University of Edinburgh for the Scottish bar, but abandoned that profession to follow his natural genius for painting. His most famous works are those in which he has combined the likenesses of distinguished characters with scenes of English sport. The "Meet of H. M. Staghounds," painted in 1837 for Lord Chesterfield, and containing no less than 46 portraits; the "Melton Hunt," executed for the Duke of Wellington; and the "Cottesmore," for Sir R. Sutton, are the best known in this class. Among his other paintings are portraits of the Queen and Prince Consort, the Marchioness of Waterford, and those of Lords Palmerston, Russell, Gough, Macaulay, Hardinge, etc. In 1842 Grant was elected Associate, and in 1851 Academician. In 1866 he became president of

the Royal Academy and was knighted. He died in Melton Mowbray, Oct. 5, 1878.

Grant, James, a Scotch novelist; born in Edinburgh, Aug. 1, 1822; and in 1832 sailed with his father, an army officer, for Newfoundland. Home again, in 1839 he was gazetted to an ensigncy in the 62d Foot, but within a few years resigned his commission and turned to literature. Having already contributed copiously to the "United Service Magazine" and the "Dublin University Magazine," he in 1846 published his first book, "The Romance of War." Among his many works may be mentioned "Adventures of an Aide-de-Camp"; "Adventures of Rob Roy"; "Frank Hilton, or the Queen's Own"; "Bothwell, or the Dark Days of Queen Mary"; "The Yellow Frigate"; "Harry Ogilvie"; and "Old and New Edinburgh." Most of his works have reappeared in foreign translations. He died in London, May 5, 1887.

Grant, James Augustus, a Scotch explorer; born in Nairn in 1827; educated at the grammar school and Marischal College, Aberdeen; was in 1846 appointed to the Indian army. His services at the battle of Gujerat, under Lord Gough, gained him the medal and two clasps, and his further services in India, in the course of which he was wounded, were honored by the Mutiny medal and clasp for relief of Lucknow. With Captain Speke he explored the sources of the Nile in 1860–1863. He also received the medal for services in the Abyssinian Expedition of 1868. Among his publications are "A Walk Across Africa"; "Summary of the Speke and Grant Expedition," in the "Journal of the Royal Geographical Society" (1872); "Botany of the Speke and Grant Expedition"; and "Khartum as I saw It in 1863." He died in Nairn, Feb. 10, 1892.

Grant, Sir James Hope, a British military officer; born in Kilgraston, Perthshire, Scotland, July 22, 1808. He first saw service in the Chinese war of 1842, and next distinguished himself at Sobraon, Chillianwalla, and Gujerat in the two Sikh wars. During the operations of the Indian mutiny Grant, who had risen to the rank of lieutenant-colonel, took a leading part, assisting in the recapture of Delhi, in the relief of Cawnpur, and in the retaking of Lucknow, and he commanded the force which effected the final pacification of India. In 1859 he conducted the war against China, defeating the enemy three times under the walls of Peking, assaulting the Taku forts, and finally capturing the capital of the empire, for which work he was created G. C. B. After commanding the army of Madras from 1861 to 1865, he returned to England, and was made general in 1872. He died in London March 7, 1875.

Grant, Robert, an American author; born in Boston, Mass., Jan. 24, 1852; was graduated from Harvard in 1873 and the Harvard Law School in 1879. Since 1893 he has been a judge of probate and insolvency for Suffolk co., Mass. Among his most popular works are: "The Little Tin Gods on Wheels" (1879); "Confessions of a Frivolous Girl" (1880); "An Average Man" (1883); "Face to Face" (1886); "The Reflections of a Married Man" (1892); "The Art of Living." He also wrote the well-known boys' stories, "Jack Hall" (1887); "Jack in the Bush" (1888).

Grant, Robert Edmond, a Scotch naturalist; born in Edinburgh, Scotland, in 1793; educated in his native city and on the Continent. Upon his return to Edinburgh in 1819 he became a Fellow of the Royal College of Physicians and began the practice of medicine. In 1827 he was elected Professor of Zoölogy and Comparative Anatomy in University College, London, a position which he occupied for the rest of his life. His chief work is "Outlines of Comparative Anatomy," for many years a favorite text-book, not only in Great Britain, but on the Continent and in the United States. He died in 1874.

Grant, Ulysses Simpson, an American statesman; 18th president of the United States; born in Point Pleasant, O., April 27, 1822, entered West Point Academy in 1839, graduated in 1843, received a commission in the United States Army in 1845, and served under Generals Taylor and Scott in Mexico. In 1852 he was ordered to Oregon, and in August, 1853, became full captain. He resigned his commission in July, 1854, and soon after settled in business at Galena, Ill. From this privacy he was drawn out by the Civil War, and having acted first as aide-de-camp to the governor of his State in 1861, and afterward as colonel of the 21st Illinois Volunteers, was appointed a Brigadier-General in July of the same year. While in command at Cairo, he secured Paducah, and with it the State of Kentucky. In November, 1861, he fought and gained the battle of Belmont,

U. S. GRANT.

Grant

and in January of the following year conducted a reconnoissance to the rear of Columbus. After capturing Fort Henry, on the Tennessee, General Grant pursued the Confederates to Fort Donelson. There a severe battle raged almost without interruption for three days and three nights, when, Feb. 15, the fort was surrendered unconditionally. This brilliant feat elevated General Grant to the rank of Major-General. Having been appointed to the command of the district of Western Tennessee, Grant advanced up that river to Pittsburg Landing, where he had to contend against a force of nearly 70,000 men. The National lines were overwhelmed, crushed, dispersed; but General Grant, undismayed, formed new lines, planted new batteries, and thus held the Confederates in check till dark, when the long expected arrival of his rear-guard of 35,000 men, under General Buell, enabled him to fight, April 6 and 7, the glorious battle of Shiloh, whence the Confederates, abandoning the field, retreated to Corinth. General Grant was second in command to General Halleck at the siege of Corinth, and when the latter was ordered to Washington, he was appointed to take command of the Department of Tennessee, in which capacity he marched against Vicksburg, the so-called "Gibraltar" of the Confederates on the Mississippi. After a long and memorable siege this important place was surrendered unconditionally, and 37,000 prisoners, 150 cannons, with an immense amount of military stores, fell into the hands of the victors.

Upon the defeat of General Rosecrans at Chickamauga, Grant was sent to repair the disaster, and, on Nov. 25, 1863, he defeated General Bragg at Lookout Mountain. This great victory, by which Eastern Tennessee was reduced and Kentucky saved, was perhaps the most brilliant strategic and tactical movement of the war; it placed General Grant on a footing with the ablest generals of any country or of any age. A few months after, March 1, 1864, Grant was raised to the highest military position in the land — under the title of Lieutenant-General he was constituted commander-in-chief of all the armies of the United States. Invested with this authority, the plan of General Grant was to destroy Lee's army. Washington was to be covered from raid, through the Shenandoah, by General Sigel. General Butler was to menace Richmond from the S. Sherman, in Georgia, was to press his campaign in that department with all vigor, that no reinforcements might be sent to the aid of Lee. General Grant with Meade's army of 150,000 N. of the Rapidan, was to draw Lee's army out of their intrenchments, and either destroy them, or compel them to rush from the menacing of Washington to the protection of their own capital. On the night of Tuesday, May 3, General Grant crossed the Rapidan and entered what is called The Wilderness. By a flank movement Grant was getting into the rear of his foe. Lee rushed from his intrenchments, and endeavored to overwhelm Grant. Then began the most gigantic and terrific campaign recorded in history.

After 11 days of bloody and almost uninterrupted battles, the two armies, on the 12th day of this unparalleled struggle, were still confronting each other, both on the defensive, sternly looking face to face, both prepared for another round. With the first dawn the battle was renewed by a tremendous but vain assault upon the Confederate lines. General Lee, nevertheless, fearing Grant might get between him and Richmond, cutting off his supplies, decided to retire, and Grant succeeded in crossing the North Anna and reached the famous banks of the Chickahominy. Finding the intrenchments of the enemy in his front too formidable to be carried by direct assault, Grant moved his troops to join General Butler at Bermuda Hundred. The performance of this movement in the presence of Lee's army, who at many points were but a few rods from him, is perhaps one of the most brilliant pages of General Grant's military career. Slowly wore away long months of expectation on the part of an impatient people.

Impenetrable to jealousy, he had but one aim, one thought — the grasping of Richmond; but the time was not yet come. With the coming of the spring of 1865, Lee, whose position and resources were quite exhausted by the self-possession and strategy of the Union commander-in-chief, now determined to assume the offensive, and on the night of March 27, 1865, he massed three divisions of his troops in front of Fort Steadman and on Grant's right, and by a sudden rush at daybreak on the following morning succeeded in surprising and capturing that important position. Before noon of the same day, however, it was retaken by the Union troops, with all its guns and 1,800 Confederate prisoners. At this time a battle, which continued until evening, was raging at Hatcher's Run. Three corps were massed under General Sheridan below Petersburg, and on Sunday morning, April 2, flanked the Confederates at Big Five Forks, capturing their intrenchments with 6,000 men. The attack, under General Grant's direction, then commenced along the whole line, and the assault was so successful that on the same night his forces held the Confederate intrenchments from the Appomattox, above Petersburg, to the river below. At 3 o'clock that afternoon General Lee telegraphed to Jefferson Davis that he had been driven from his intrenchments, and that Petersburg and Richmond must be abandoned,

which operation was performed that night; and on the next day, April 3, 1865, the National army entered Petersburg, and General Weitzel occupied Richmond. By rapid movements, General Grant cutting off Lee's retreat to Lynchburg and Danville, came up with him at Appomattox Courthouse, and demanded his immediate surrender. The two chiefs met and arranged the details, and on Sunday, April 9, the Army of Northern Virginia capitulated. The whole of General Lee's Army was paroled, with permission at once to return home. The officers were granted the privilege of retaining their side-arms, horses and baggage, and each private claiming a horse was permitted to keep it. All other property belonging to the Confederate government in the department was surrendered to the United States.

In 1866 General Grant was promoted to the rank of General, that honor being created specially for him. In August, 1867, on the suspension of Mr. Stanton by President Johnson, General Grant consented to fill the office of Secretary of War ad interim, but the Senate having refused to approve the suspension, General Grant, Jan. 13, 1868, surrendered the office to Mr. Stanton. On June 20, 1868, General Grant was unanimously nominated by the Republicans as a candidate and elected the following November President of the United States, in which capacity he served till 1877, being reëlected at the end of his first term.

On May 17, 1877, accompanied by his wife and one son he sailed from Philadelphia, Pa., for a tour around the world. Not only did he receive a grand farewell from his own countrymen, but when he arrived in the Mersey River, England, the ships of all nations gathered there displayed their flags to greet him. In England a grand reception was accorded him in every city he visited. He was received by Queen Victoria and the Prince of Wales in London, and later visited the Queen at Windsor Castle. After visiting the other countries of Europe and being entertained by all the crowned heads, the United States man-of-war "Vandalia" was placed at his service and on board her he made a cruise of the Mediterranean Sea. He then visited Bombay and Calcutta in India, Hong Kong, Canton and Peking in China, and finally Japan. On Sept. 20, 1879, he arrived at San Francisco, where a magnificent demonstration was made in his honor, and during his route E. he was given public receptions and greeted with every mark of honor wherever he stopped.

He was placed on the retired list of the army by a special act of Congress in March, 1885, with the rank and pay of General. During the last few months of his life he wrote his "Memoirs," which was published soon after his death, on Mount McGregor, near Saratoga, N. Y., July 23, 1885. The construction of a magnificent mausoleum for his remains was begun in Riverside Park, New York city, on April 27, 1891, and it was dedicated on April 27, 1897, in the presence of one of the greatest concourses of people and with one of the greatest parades ever witnessed in the United States. The mausoleum exclusive of steps and portico projections is about 100 feet square at the base and the height 160 feet from the ground and nearly 300 feet from the level of the Hudson river. There is an outer gallery 130 feet above the base from which the country may be seen for miles around.

Grantham (grant'am), a parliamentary borough of Lincolnshire, England, on the Witham river, 25 miles S. S. W. of Lincoln. It lies on the ancient Ermine street; is an important junction on the Great Northern Railway; and a canal, 30 miles long, connects it with the Trent near Nottingham. Among the notable buildings is the St. Wolfram's Church, which, in style mainly Early English of the 13th century, was restored by the late Sir G. G. Scott since 1865. An Eleanor cross was demolished in 1645, and a castle has left no trace; but the quaint Angel Inn is still standing, in which Richard III. signed Buckingham's death warrant. Oliver Cromwell here, May 13, 1643, won his first success; but the town's greatest glory is Sir Isaac Newton, who, during 1655–1656, attended its grammar school. A bronze statue of him by Theed was erected in 1858. The school was founded by Bishop Fox in 1528, reëndowed by Edward VI. in 1553, and reconstituted in 1876. The manufacture of agricultural implements, malting, and brick-making are the chief industries. Grantham was incorporated by Edward IV. in 1463. The borough boundary was largely extended in 1879. Pop. (1901) 17,593.

Grant Land, a North Polar region, lying N. of Grinnell Land, between lat. 81° and 83° N., discovered by Hayes, Hall, and Nares, in 1875, and partly explored by Nares, who wintered on its coasts, in the most N. latitude (82° 27′) in which the winter had been passed by any ship.

Grant University, a coeducational institution in Chattanooga and Athens, Tenn.; formed under the auspices of the Methodist Episcopal Church in 1889 by the affiliation of Chattanooga University (1886) and Grant Memorial University at Athens (1867), with all departments excepting the preparatory at Chattanooga; has endowment of about $250,000; grounds and buildings valued at over $380,000; ordinary income, $65,000; average number of faculty, 65; students, 650; graduates, over 1,400.

Granular Limestone, a metamorphic limestone, composed of small grains or minute crystals intersecting each other in all directions, so as to produce a glimmering luster, though they themselves taken singly are brilliant. It is white, gray, yellowish, bluish-gray, reddish, greenish, etc., occasionally veined or spotted. It has no fossils, but at times contains various minerals, such as quartz, garnet, mica, hornblende, talc, actinolite, asbestos, sulphuret of lead and of zinc, etc. Of old it was called also primitive limestone, but it is now known that it may be of any age. It is often called crystalline limestone. Probably it is in all cases indirectly of animal origin. A variety of it is called statuary marble.

Granulated Steel, a steel produced by scattering melted pig-iron by a wheel into a cistern of water, and thus reducing to fragments. These are imbedded in powdered hematite or sparry iron ore, and subjected to furnace heat. The exterior of the fragments become decarbonized and thus reduced to the condition of malleable iron. The metal is made homogeneous by melting, and steel is produced.

Granule, a minute grain of a simple mineral, as one of the mechanically united constituents of a rock. Granules of Langley, in astronomy, minute bodies scattered over the whole surface of the sun, and assumed to be the immediate source of solar light and heat.

Granulose, a name given to the part of the starch granules which is dissolved by dilute acids and acted on by ferments; the residue is said to consist of a variety of cellulose, insoluble in water, which by long boiling is converted into granulose.

Granvella (grän-vel'lä), **Antoine Perrenot de,** a Spanish ecclesiastic; born in Franche-Comté, Aug. 20, 1517; studied law at Padua, and theology at Louvain. He was in 1540 appointed Archbishop of Arras. Succeeding his father in the chancellorship in 1550, he accompanied Charles V. in the flight from Innsbruck, and framed the treaty of Passau, 1552. On the abdication of Charles in 1555 he transferred his services to Philip II. In 1559 he was appointed prime minister to Margaret of Parma in the Netherlands. In 1560 he was created Archbishop of Malines, and next year was made cardinal. Such, however, was the hostility which his policy of repression provoked in the Low Countries that at the king's advice he retired in 1564 to Franche-Comté. After six years of comparative quiet he in 1570 represented Spain at Rome in drawing up a treaty of alliance with Venice and the papal see against the Turks. For five years (1570–1575) he successfully held the office of Viceroy of Naples. He died in Madrid, Sept. 21, 1586.

Granville (gron-vēl'), a seaport in the department of La Manche, France, on a rocky promontory on the English Channel, 23 miles N. E. of St. Malo. The 15th century church and a hydrographic college are the principal institutions. The town was captured by the French in 1450, and the English in 1695, and unsuccessfully besieged by the Vendéans in 1793, and the English in 1803. Pop. (1901) 11,667.

Granville, Earl. See CARTERET.

Granville, George Leveson-Gower, 2d Earl, an English statesman; born in London, May 11, 1815; educated at Eton and Oxford, and entered Parliament in 1836 as member for Morpeth, exchanging that seat for Lichfield in 1840. He succeeded to the peerage in 1846, and five years later entered the cabinet of Lord John Russell, holding the seals of the Foreign Office. From that time forward he held office in every Liberal ministry. He became president of the Council in 1853, and leader of the House of Lords in 1855. He labored arduously in connection with the great exhibitions of 1851 and 1862. Lord Granville was charged to form a ministry in 1859; but having failed to do so he joined Lord Palmerston's second administration. He retired with Earl Russell in 1866, having the preceding year been made Lord Warden of the Cinque Ports. In December, 1868, he was appointed Colonial Secretary in Mr. Gladstone's first ministry, and on the death of Lord Clarendon in 1870 became Secretary for Foreign Affairs. He arranged the treaty between England, France, and Prussia guaranteeing the independence of Belgium; and confirmed with Prince Gortchakoff the agreement that Afghanistan should form an intermediary zone between England and Russia. In 1880 he again became foreign secretary under Mr. Gladstone, and displayed considerable diplomatic skill in matters relating to the Berlin treaty, the occupation of Tunis, and the revolt of Arabi Pasha in Egypt. He retired with his chief in 1885, but returned once more to office as colonial secretary in 1886, resigning again with his colleagues in August of the latter year. He died in London March 31, 1891.

Grape, the fruit of *Vitis vinifera,* or the plant itself. The native country of the vine is the region round the Caspian Sea, extending through Armenia as far W. as the Crimea. It has been cultivated from the remotest antiquity (Gen. ix: 20). It flourishes in Turkey, Greece, Italy, Spain, France, Germany, Great Britain, and the United States. Bear's grape is *Vaccinium arctostaphylos,* also *Arctostaphylos uva ursi;* the Corinth grape is the black Corinth variety of *Vitis vinifera,* the one which furnishes dried currants; the sea-grape is *Ephe-*

dra distachya, also *Sargassum bacciferum;* and the seaside grape *Coccoloba uvifera.*

Grapefruit, a smaller variety of the shaddock (*q. v.*).

Grapeshot, a spherical iron shot, rather less than half the diameter of the bore of the piece for which they are intended, and put up in stands consisting of three tiers of three shot each; the stand has a circular cast-iron plate at top and bottom, connected by a bolt and nut. Quilted grape is formed by sewing the shot up in a sort of canvas bag, which is afterward wrapped around with twine or cord, so as to form meshes; bullets put up in this way were formerly employed for bluderbusses and small artillery. This form has some resemblance to a bunch of grapes, whence the name. Grapeshot has been generally superseded.

Graphic Formula, in chemistry, a formula representing the relations of the atoms contained in a molecule to each other. Thus, the nitro-paraffins contain the same number of atoms of the various elements as are contained in the corresponding nitrous ethers, as CH_4NO is the formula for methyl nitrite and nitromethane, but the graphic formula shows that in nitromethane the nitrogen atom is in direct union with a carbon atom, and in methyl nitrite the nitrogen atom is attached to an oxygen atom.

Graphic Granite, a granite consisting of felspar (orthoclase), quartz, and a little mica. When a section is made in a particular direction, an appearance is presented as if the stone had been written over with characters bearing a remote resemblance to Hebrew letters.

Graphic Method, an analytical method of representing forces, motions, etc., by lines. Similarly, any other physical quantity, such as temperature, atmospheric pressure, or barometric height, electric potential, etc., may be represented by straight lines. Graphic methods are largely employed in physical investigations as aids to calculation, and for the purpose of exhibiting the nature of the law according to which some phenomena vary. The principal use of this method is to show the mutual variations of two quantities. This we will illustrate by a particular example. Suppose a table is drawn up, in one column of which are the months of the year, and in the other the corresponding average temperatures of the air, at some particular place, during these months (the average temperature for each month being the mean of the daily temperatures). Let two lines, OX and OY, be drawn from O, one horizontally, the other vertically; let the successive months of the year be represented on any convenient scale along OX, and let temperature be measured along OY, also on a convenient scale. Corresponding to each month in the year there will be a length along OX, and to each temperature there will correspond a point on OY. At the middle point corresponding to each month draw perpendicular to OX a line representing the temperature on the scale of OY. A series of lines will thus be obtained, through the upper ends of which there may be drawn, freehand, a smooth curve. The points on the curve in the figure represent the upper ends of these lines. A general glance at such a curve will reveal certain features regarding the temperature of the whole year; at what dates maxima and minima occurred; when the temperature rose or fell quickest, and so on.

Graphis, a genus of lichens that gives its name to a natural order, *Graphideæ,* remarkable for the resemblance which the fructification (apothecia, or shields) assumes to the forms of the letters of Oriental alphabets. *G. scripta* is common in the north of Europe, but the great majority of the species—some twenty in all—are tropical.

Graphite. See Black Lead.

Graphitic Acid, a transparent substance that forms oblique crystals, obtained by long-continued and repeated action of a mixture of chlorate of potassium and the strongest nitric acid upon purified graphite.

Graphophone, an apparatus for reproducing sound; invented by Charles Sumner Tainter in 1880. It is constructed on the principle of the phonograph, with a main cylinder, coated with wax, which revolves against the point of a needle. This in turn connects with a diaphragm at the end of a tube running from the funnel mouthpiece. When words are spoken into the mouthpiece the vibrations of the diaphragm cause the needle to make a record on the wax cylinder. When the machinery is reversed, the sounds are thrown out in their original form. The commercial advantages of the graphophone over the phonograph is its adaptability to office and stenographic work. For instance, a stenographer reads the notes he has taken into the funnel connecting with the main cylinder. This cylinder envelopes a screw which prevents the needle tracing a firmer line. When the stenographer finishes reading his report another operator attaches tubes to the cylinder, connecting with his ears, works the machine, and the words of the stenographer are repeated to him in the same tone of voice of the previous talker. The rapidity of the talk can be regulated, and the operator can thus with ease take down the exact words by the use of a typewriter or an ordinary pen. See Phonograph.

Graphoscope, an optical apparatus for magnifying and giving fine effects to engravings, photographs, etc. Invented by C. J. Roswell, exhibited in 1871.

Graphotype, a process for obtaining blocks for surface-printing. A zinc plate is covered with a thick coating of oxide of zinc, placed under a hydraulic press to make a perfectly plane and hard surface, and the design drawn on the oxide with an ink consisting of a chloride of zinc and a menstruum. This produces, as to the parts where the ink touches, a very hard material, the oxychloride of zinc. The remaining surface is rubbed away by brushes, velvet, and the fingers, leaving the lines in relief to be printed from.

Graptolites (-lī'tēz), a genus belonging to the mineral kingdom, instituted by Linnæus, and placed by him in his class *Fossilia* and his order *Petrificata.* He defines it as a petrifaction resembling a picture. One species resembles a map; a second is variegated Florentine marble; another looks like a fossil alga; a fourth is a recent serpula on oysters and other shells; and a fifth dendritic markings on agates. None of these are graptolites in the modern sense.

Graptolitidæ (lit'i-dē), a sub-class, formerly a family of *Hydrozoa.* They have a compound hydrosoma, occasionally branched, consisting of numerous polypites protected by hydrothecæ, and united by a cœnosarc inclosed in a strong tubular polypary. Their nearest living allies are the *Sertularida.* Some have a row of cellules only on one, and others on both sides. They are characteristic Silurian fossils. They occurred where the sea-bed was of mud. Professor Allman calls the sub-class which they constitute *Rhabdopleura.* Genera *Graptolites* and *Rastrites,* with rows of cellules only on one side, the former coiled like a watch-spring, *Diplograpsus, Didymograpsus,* etc., with two rows, the cellules in the latter turned to, and in the former away from, each other.

Gras, Felix, a Provençal poet; born in Malemort, France, May 3, 1844; became a lawyer and "juge de paix" in the department of Vaucluse, and one of the leading Provençal writers, standing next in popular estimation to Mistral. His most famous works are: "The Reds of the Midi," and its sequel, "The Terror," stories of the French Revolution, translated into English by Mrs. T. A. Janvier; "Li Carbouniè" (1876); "Toloza" (1882), epic poems; "Lou Roumancero Prouvençau" (1887), shorter poems; "Li Papalino" (1891), Avignon stories. He was also editor of the "Armana Prouvençau," a literary annual; and after 1891 was the "Capouliè," or official head, of the "Félibrige," the society of Provençal men of letters. He died in March, 1901.

Grass, the botanical order *Graminaceæ,* a very extensive and important order of endogenous plants, comprising about 250 genera and 4,500 species, including many of the most valuable pasture plants, all those which yield grain, the sugar-cane, bamboo, etc. The roots are fibrous; the stem or culm is usually cylindrical and jointed, varying in length from a few inches to 80 or 90 feet, as in the bamboo, and coated with silex; leaves, one to each node or joint, with a sheathing petiole; spikelets terminal, panicled, racemose, or spiked; flowers hermaphrodite or polygamous, destitute of true calyx or corolla, surrounded by a double set of bracts, the outer constituting the glumes, the inner the paleæ; stamens hypogynous, three or six; filaments long and flaccid; anthers versatile; ovary solitary, simple, with two styles, one-celled, with a single ovule; fruit known as a caryopsis, the seed and the pericarp being inseparable from each other. In its popular use the term grass is chiefly applied to the pasture grasses as distinct from the cereals, etc.; but it is also applied to some herbs which are not in any strict sense grasses at all, *e. g.,* rib-grass, scurvy, and whitlow grass.

Grasscloth, a cloth made from the grassy fibers of the inner bark of the GRASSCLOTH PLANT (*q. v.*). It equals the best French cambric in softness and fineness. In India it is made into light white jackets, used by guests at parties when cloth coats would be oppressively hot.

Grasscloth Plant, in botany, *Böhmeria nivea,* one of the *Urticaceæ.* It grows in Sumatra, China, and Assam. Called more fully the Chinese grasscloth plant.

Grass Hemp. See SISAL.

Grasse, Johann Georg Theodor (gres'se), a German bibliographer; born in Grimma, Saxony, Jan. 31, 1814; was private librarian of King Frederick Augustus II. of Saxony and director of several of the famous libraries of Dresden. He was the author of "Manual of a Universal History of Literature" (1837–1859); "Treasure of Rare and Precious Books" (1858–1869); etc. He died near Dresden Aug. 27, 1885.

Grasse-Tilly (gräs-tē-yē'), **François Joseph Paul, Comte de,** a French naval officer; born in Volette, France, in 1723; joined the navy in 1734. He was given command of a French fleet early in 1781 and ordered to aid the Americans. In April of that year he sailed with a fleet of 29 vessels and 3,000 troops for Chesapeake Bay; blockaded the James and York rivers, and landed his troops to prevent the retreat of Cornwallis. In October the combined forces of the Americans and French compelled the surrender of Cornwallis, and Grasse with other officers received the thanks of the American Congress. He died in Paris, France, Jan. 11, 1788.

Grasshopper, the name of various leaping insects of the order *Orthoptera* nearly akin to the locusts. They are characterized by very long and slender legs, the thighs of the hinder legs being large and adapted for leaping, by large and delicate wings, and by the wing-covers extending far beyond the extremity of the abdomen. Grasshoppers form an extensive group of insects, and are distinguished by the power which they possess of leaping to a considerable distance, and by the stridulous or chirping noise the males produce by rubbing their wing covers together. They are generally of a greenish color.

Grassi, Angela (gräs'sē), a Spanish novelist; born in Crema, Italy, April 2, 1826. Her childhood was passed at Barcelona, where at 15 she wrote the successful drama "Crime and Expiation." "Riches of the Soul" and "The Drop of Water" won a prize from the Spanish Academy. "The Son-in-Law," "The First Year of Marriage," and "The Snowball" are her best-known novels.

Grass of Parnassus, a genus of plants belonging to the natural order *Saxifragaceæ*. The popular and also the botanical names are founded on the myth that the best-known species first appeared on Mount Parnassus, the abode of grace and beauty. The plant is a native of bogs and moist heaths in Great Britain and throughout Northern Europe and Russian Asia, becoming a mountain plant in Southern Europe and West Central Asia. The calyx is deeply 5-cleft, the petals white, 5 in number, and there are 5 perfect and 5 imperfect stamens, the latter bearing instead of anthers a tuft of 10 to 12 globular-headed hairs. There are several other species natives of Asia and North America.

Grass Oil, a name under which several volatile oils derived from widely different plants are grouped. The grass oil obtained by distillation from the leaves of *Andropogon warancusa* is used for rheumatism, and has the same stimulant effect as cajeput oil. Ginger-grass oil is obtained from *A. nardus*, a native of India, and other species of the same genus. Geranium oil, derived from *Pelargonium radula*, is so like ginger-grass oil in its properties that they are used for the same purposes, and are bought and sold under either name, mainly as an adulterant of oil of rose. Turkish grass oil is obtained from *A. pachnodes*, indigenous to India, Persia, and Arabia. Lemon-grass oil, or citronella oil, is derived by distillation from *A. schœnanthus*, indigenous to India and cultivated in Ceylon. It has an odor resembling oil of citron, and is largely used for scenting soap. Cyperus-grass oil is extracted from the tubers of *Cyperus esculentus*, indigenous to Southern Europe, and is used both as a table oil and in the manufacture of soap.

Grass Tree, in botany, the liliaceous genus *Xanthorrhœa*. On the Swan river and elsewhere in Australia they furnish valuable fodder for cattle. Before the native Tasmanians became extinct, they were wont to eat the tender leaves at the top of the stem. The name grass tree is used also of *Richea dracophylla* and *Kingia australis*.

Grasswrack, a genus of plants of the natural order *Naiades*, one of the few genera of phanerogamous plants which grow among seaweeds at the bottom of the sea. The leaves are narrow and grass-like, and the flowers consist merely of stamens and pistils, without any perianth, inserted on the central nerve of one side of a flat thin linear spadix, with a leafy spathe. The pollen is confervoid. The common grasswrack is a perennial plant, which forms green meadows on the sandy bottom of shallow parts of almost all the European seas, and abounds in creeks and salt-water ditches. It is found in great plenty on the British shores. It becomes white by exposure to the air. The rush-like coverings of Italian liquor flasks are made of it, it is much used for packing glass bottles; and it serves well for thatch. Cattle eat it as forage; it is burned to obtain soda, and has been employed in the manufacture of paper. It has been long used in Holland, Iceland, and elsewhere for stuffing pillows and mattresses; and this use has of late years very much extended, so that the plant has become an article of commerce, under the name of *Alga marina*, or more commonly, but incorrectly, *Alva marina*.

Gratacap, Louis Pope, an American scientist; born in Brooklyn, N. Y., Nov. 1, 1851; was graduated at the University of New York in 1869, and at the Columbia School of Mines in 1876; and has been engaged since in making geological and mineralogical investigations. He is the author of "Analytics of a Belief in a Future State"; "Protection, a Reasonable Doctrine"; "Centralization, the Cure for Political Corruption"; "The Silver Catechism"; "Philosophy of Ritualism"; etc.

Gratian (grā'shan), a Roman emperor; eldest son of Valentinian I. by his first wife Severa; born in Pannonia 359 A. D.; elected by his father to the rank of Augustus, 367. On the death of Valentinian, 375, the troops elevated Gratian to the throne, giving him at the same time as a colleague his half-brother Valentinian II. During the first part of his reign a fierce warfare was carried on against the tribes who possessed the Danubian provinces and Illyricum; and he was on the point of marching into Thrace, to assist his uncle Valens against the Goths, when he was suddenly

called upon to defend his dominions against the Lentienses, a tribe of the Alemanni. After the invaders had been defeated, Gratian advanced toward the Eastern Empire, but while on the way he learned that his uncle Valens had been defeated and killed by the Goths near Adrianople, 378. The sovereignty of the Eastern Empire then devolved on Gratian, but feeling his inadequacy to the task of ruling the whole empire, he recalled Theodosius from Spain, and appointed him his colleague, 379. Gratian possessed some admirable virtues; but his fondness for frivolous amusements and unworthy associates excited the contempt of the army, so that when Maximus was proclaimed emperor by the legions in Britain crowds of the disaffected flocked to his standard. Gratian was defeated by him near Paris, and afterward fled to Lyons, where he was overtaken and killed, 383.

Gratien, Henri. See BERTRAND, COUNT.

Gratiola (grā″ti-ō′lä), the hedge-hyssop, a genus of plants, order *Scrophulariaceæ*, having a five-partite calyx, the upper lip of the corolla bifid, the lower trifid, only two stamens fertile, and the anthers pendulous. *G. officinalis*, a European species, is extremely bitter, acts violently as a purgative, diuretic, and emetic, and in overdoses is an acrid poison. It is administered in cases of worms, jaundice, dropsy, scrofula, mania, and venereal diseases; but requires to be used with caution. It was formerly so highly esteemed as a medicine that the name of Grace of God was given to it, and for the same reason it is known in France as poor man's herb. It is said to be the basis of the famous gout medicine called *Eau medicinale*. *G. Peruviana*, a South American species, and *G. Virginica*, a native of this country, have somewhat similar properties, which are supposed to depend on a bitter resinous principle called gratiolin.

Gratiolin (grā′-), a glucoside contained in *Gratiola officinalis*. It dissolves in sulphuric acid, forming a purple solution. When boiled with dilute sulphuric acid it yields gratioletin $C_{17}H_{28}O_5$, a crystalline substance insoluble in water and ether; gratioleretin, $C_{17}H_{28}O_3$, a resinous substance insoluble in water, but soluble in ether; and glucose.

Gratry, Auguste Joseph Alphonse (grä-trē′), a French theologian; born in Lille, March 30, 1805; studied mathematics; was admitted to the Ecole Polytechnique in 1825; entered the ecclesiastical profession; was appointed director of the College of Stanislas in 1841, and Almoner to the École Normale Supérieure in 1846. The Abbé Gratry quitted the Normal School in 1851 in order to devote himself with the Abbé Petetot to the reconstruction of the Oratorians of the Immaculate Conception, and was appointed Professor of Evangelical Morality at the Sorbonne, 1863. In addition to his "Letters and Replies to M. Vacherot," Gratry published in 1855–1857, a course of philosophy in three parts, under the following titles: "The Knowledge of God"; "Logic"; and "The Knowledge of the Soul"; "The Philosophy of the Creed"; "The Sources" in 1861–1862; "Commentary on the Gospel of St. Matthew" in 1863; "Jesus Christ," "Response to M. Renan," and "The Sophists and the Critic," in 1864. He was elected to the French Academy in 1867. He died Feb. 6, 1872.

Grattan, Henry, an Irish statesman; born in Dublin, July 3, 1750; graduated at Trinity College, and went to London to study and practise law. In 1772 he was called to the bar in his native country, and three years after entered the Irish House of Commons, where his brilliant eloquence and energetic bearing soon raised him to distinction as a gifted speaker.

He immediately became distinguished in the opposition and infused that spirit into the country, which in two years aroused 80,000 volunteers and produced in 1782 a repeal of the statute of 6th George I., which had enacted that the crown of Ireland was inseparably connected with that of Great Britain; that Ireland was bound by British acts of Parliament when named therein; that the Irish House of Lords had no jurisdiction in matters of repeal; and that the last resort in all cases of law and equity was the British House of Lords. For his share in the acquirement of this concession the Irish Parliament in a burst of national enthusiasm, voted him £50,000 and a house and lands for him and his heirs forever. Mr. Grattan was returned for the city of Dublin and remained an active senator until the premature recall of Earl Fitzwilliam.

At the opening of the century when the union was carried Mr. Grattan entered the House of Commons, being returned for Malton, Yorkshire, in 1805, and in the following year for Dublin. He died in the service of the cause of Catholic emancipation; for, being unanimously called on by the Catholic body to carry their petition to England, and to present and support it in the House of Commons, when the exertions were represented by his friends as incompatible with his age and declining health, he nobly replied that "he should be happy to die in the discharge of his duty." He did in fact die soon after his arrival in London, June 4, 1820.

Grattan, Thomas Colley, an Irish novelist; born in Dublin in 1792. He abandoned law for the army, and from a wandering life obtained materials for his "Highways and Byways" (1823), a col-

lection of tales and studies that proved highly popular. "The Heiress of Bruges" (1828) is a historical novel. Some less important fictions, plays, and translations of French poetry complete the sum of his literary product. He died in London, July 4, 1864.

Gratz (gräts), a city and capital of Styria, Austria, 141 miles S. S. W. of Vienna. It is a picturesque old town with four suburbs, built on both sides of the Mur, and encircled by fine gardens and pleasure grounds. Of the former fortress, erected on a hill in the center of the town, and dismantled in 1809 by the French, two towers and other remains still exist. The town itself contains several old buildings, as the Late Gothic cathedral (1462), two other Gothic churches (one built in 1283), the ancient castle of the Styrian dukes, the Landhaus, where the nobles of the duchy held their meetings, the university, originally founded in 1586, an armory, palaces of the Styrian nobles, and four monasteries dating from the 16th and 17th centuries. There are also national archives, a cabinet of coins and antiquities, a technical school (Johanneum), a second library of 70,000 volumes, and a botanic garden. The most important of its many industries are the manufacture of machines, steel goods, rails and railway carriages, sugar, wine, perfumery, stearine candles, soap, etc. Fat capons, biscuits, and chocolate figure prominently as articles of trade. Gratz is a favorite place of residence for Austrian officials retired from service. The town is mentioned in the annals as early as 881. In 1481 it repulsed the Hungarians from its walls, and in 1532 the Turks. In 1797, and again in 1809, it was occupied by the French. In the vicinity are several hydropathic establishments and holiday resorts. Pop. (1900) 138,080.

Graubunden. See GRISONS.

Graudenz (grou'dents), a town in the province of West Prussia, Germany; on the Vistula, 37 miles N. of Thorn. It carries on a trade in corn, wool, and cattle, and has iron foundries, breweries, and tapestry and cigar manufactories. About a mile N. of it on a hill is the fortress of Graudenz, built in 1776, and successfully defended against the French in 1807. It was maintained as a fortress till 1874, and now serves as a barrack and military prison. Pop. (1905) 35,995.

Grave Creek, latterly **Moundsville,** a city and county-seat of Marshall co., W. Va.; on the Ohio river, and the Baltimore and Ohio, and the Ohio River railroads; 12 miles S. of Wheeling. It is pleasantly situated on a tongue of land about a mile in width, formed by the junction of the Big and Little Grave cheeks, and was formerly divided into two villages, which were called Elizabethtown and Moundsville. The latter received its name from the Mammoth Mound in the vicinity, one of the largest remains of the mound builders in the United States. It is in a coal mining and farming region. Pop. (1900) 5,362; (1910) 8,918.

Gravedigger, a name given in Jamaica to a fossorial insect of the order *Hymenoptera,* family *Sphegidæ,* which digs holes in clay in which it lays its eggs, depositing along with them, for the future sustenance of its larvæ, caterpillars and spiders slightly stung, so as to leave them half dead. Its allies everywhere pursue essentially the same method of operation.

Grave Mound, in anthropology, extensive mounds, occurring in various portions of North America, especially in the Ohio and Mississippi valleys, in which aboriginal remains, flint arrow-heads, and pottery are found. These mounds are supposed to have been formed by a race who preceded the Indians in their occupancy of this country, and who are now distinguished only by the indefinite name of MOUND BUILDERS (*q. v.*).

Gravel, small pebbles, stones, or fragments of stone, intermixed with sand loam, clay, flints, etc., formed by the action of water upon disintegrated portions of rock which tend to be first blocks or bowlders, then pebbles, next gravel, and finally sand, if not even silt. The fragments of which it is composed vary from the size of a pea to that of a hen's egg.

In pathology, the presence of minute concretions in the urine. It is usually owing to the presence of uric acid, urates, oxalates, and phosphates. Among exceptional urinary calculi are carbonate of lime, cystine, xanthine, fatty and fibrinous concretions. The chief symptoms are dull, aching pains over the renal regions, extending to the thighs, frequent micturition, and the occasional appearance in the urine of blood, pus, epithelium, or unorganized sediments, chiefly uric acid and oxalates.

Gravelines (gräv-lēn'), a town in the department of Nord, France; at the mouth of the Aa, 13 miles E. N. E. of Calais. Considerable historical interest is attached to the place, as the scene of Egmont's victory over the French (1558), and the place off which the English dispersed the Armada (1588). It was taken by the French in 1644, retaken by the Austrians after a 10 weeks' siege in 1652, and finally recaptured in 1658 by Louis XIV., who had it fortified by Vauban. Pop. (1901) 6,202.

Gravelotte (gräv-lot'), a village of Lorraine, 7 miles W. of Metz. There, on Aug. 18, 1870, the French under Bazaine sustained a severe defeat by the Germans.

Grave of France, The, a name given to the field of Waterloo.

Grave Post, a board fixed at the head of the graves of many Indian tribes. It usually contains the totem of the deceased, and should the tomb be that of a warrior, devices denoting how often he had been in war parties and the number of scalps he had taken.

Graver. See BURIN.

Gravesend, a port and borough of Kent, England, on the Thames, 24 miles E. S. E. of London. It consists of the old town, with narrow, irregular streets, and of the handsome new town on the high ground. In the vicinity are extensive market gardens; and many of the inhabitants are employed in fishing. Gravesend forms the limit of the port of London; and here pilots and custom-house officers are taken on board of vessels going up the river. For centuries the prosperity of the town has depended on its connection with the metropolis. It carries on some shipbuilding, iron-founding, soap-making, and brewing, and a considerable trade in supplying ships' stores. Gravesend was incorporated under Elizabeth; was originally a hythe, or landing-place; and is mentioned as such in Domesday. Around this landing place a town grew up soon after the Conquest. Here the fleets of early voyagers, as that of Sebastian Cabot in 1553, and of Martin Frobisher in 1576, assembled, and here the lord mayor, aldermen, and city companies of London were wont to receive all strangers of eminence and to conduct them up the river in state. Pop. (1901) 27,196.

Gravière, Jean Pierre Edmond Jurien de la (grä-vyar'), a French author; born in Brest, France, Nov. 19, 1812; served with distinction in Chinese waters (1841), the Black Sea, and the Mediterranean; and as commander of the expedition against Mexico arranged the treaty of Soledad (1861). He was chosen a member of the French Academy in 1868. His numerous works include: "Sardinia in 1841" (1841); "Souvenir of an Admiral" (1860); "The Ancient Navy"; "The Modern Navy"; "Maritime Wars of the Revolution and Empire"; "The Navy of the Ancients and the Campaigns of Alexander"; a great work which places the author in the front rank of military historians. He died in Paris, March 5, 1892.

Gravigrada (-grā-dä), in palæontology, ground-sloths; a tribe or family of edentate mammals, now extinct. The name is modeled on *Tardigrada*, sometimes used for the *Bradypodidæ*, or ordinary sloths, to which the *Gravigrada* were akin. Besides other differences, they were much larger. The tribe or family comprised the huge megatherium, the mylodon, the megalonyx, etc. All are American, and of Post-pliocene age.

Graving Dock, a dock into which vessels are floated to have their bottoms examined and cleaned; a dry dock. The vessel is floated in and the gates at the entrance closed when the tide is at ebb. See DOCK.

Gravitation, in physics, a natural force acting on all material bodies throughout the universe, with the effect of attracting or drawing them to each other. Hence it is often called the attraction of gravitation. It has been shown that every molecule of one body acts on every molecule of the other. The attraction between two material particles is directly proportional to the product of their masses, and inversely proportional to the square of their distances asunder — *i. e.*, the force of gravity decreases in exact proportion as the square of the distances increases. Universal or general gravitation may be divided into celestial and terrestrial gravitation; but when the earth is viewed as a planet the second category disappears in the first.

Among the heavenly bodies two forces operate against each other, the one a projectile and the other an attractive force. If the former only existed, the several planets would go off into space, moving, unless collision with other bodies occurred, in straight lines onward forever, unless, indeed, some subtle ether gradually retarded their progress and ultimately brought them to a state of rest. If gravity alone operated, the planets would fall toward the center of the sun with continually increasing velocity till they impinged on his surface with destructive effect. The working against each other of the two antagonistic forces makes them move around the central luminary in elliptic orbits, the motion being so beautifully adjusted that when the planet is nearest the sun and apparently in danger of becoming too powerfully under his attraction, the increased velocity thus acquired carries the body past the danger. Not merely does the sun attract the planets, but the planets attract the sun. Properly speaking, they do not revolve around him, but he and they mutually revolve round the common center of gravity of them all, which is a point (not the center) within the body of the sun. The same laws operate in the case of the planets with each other, the primary bodies with their satellites, *i. e.*, they attract each other directly as their respective masses, and inversely as the square of their distances.

History.— A glimmering perception that the heavenly bodies attracted each other was possessed by Democritus and Epicurus in ancient times, and by Bacon, Galileo, Kepler, and Hooke during the dawn of mod-

ern science; but the decisive discovery of the universality of gravitation and the "law" regulating the operations was reserved for Sir Isaac Newton. Cavendish illustrated Newton's discovery by experiment.

Gravity, in physics, the terrestrial gravitation, the operation of the law of gravitation on the earth, specially in making heavy bodies fall in all parts of the planet in the direction of its center. Newton and Bessel have shown that in a vacuum a sovereign and a feather will fall with equal speed, though the rate will be very different in the atmospheric air. The attraction of the whole earth, considered as a sphere, on a body at its surface, is the same as if the whole matter of the earth were collected at its center. The attraction of the earth on a body within its surface is the same as if the spherical shell situated between the body and the earth's surface was removed; or is the same as if all the matter situated nearer to the earth's surface than the body was collected at the center, and all the matter situated at a greater distance was removed. The weight of a body is proportioned to the attraction which it exerts, hence gravity in many cases means simply weight.

Gravity, Center of. See CENTER OF GRAVITY.

Gravity, Specific, in physics, the relative density of a substance; the weight of a body compared with that of another body having the same magnitude. To obtain this, it is first weighed in air, which shows its absolute weight. Next it is weighed in water, to show how much it loses in this element. There have now been ascertained the absolute weights of two bodies of equal bulk — viz., the one experimented on, and water, and the ratio of these weights is that also of their specific gravities. Let 1 be the weight of water, and first let the body be heavier than that liquid, then the weight which it loses in water is to the absolute weight as 1 to the specific gravity required. If lighter than water, then as the weight of the body in air, plus the weight needful to make it sink in water, is to its weight in air, so is 1 to the specific gravity. On this principle are constructed such instruments as Nicholson's portable balance. In solids and liquids the standard is generally distilled water; for the gases, atmospheric air. Specific gravity is proportionate to density, and the words may be used almost interchangeably.

Gravitv Battery, a form of double-fluid battery, in which the fluids range themselves at different heights in a single jar by virtue of their different specific gravities. The copper or — element is in the bottom, and the zinc or + in the upper part of the cell.

Grawatha, in botany, a kind of *Bromelia* used in South America for the manufacture of ropes; called also curratow.

Gray, a town in the department of Haute-Saône, France, on the Saône, here crossed by a stone bridge of the 13th century; 25 miles N. W. of Besançon. It has remains of an ancient castle of the dukes of Burgundy, some trade in corn, flour, and iron, and iron industries and boatbuilding.

Gray, Asa, an American botanist; born in Paris, Oneida co., N. Y., Nov. 18, 1810. He took his degree of M. D. in 1831, but soon relinquished the practice of medicine, and devoted himself to botany. In 1834 he received the appointment of botanist of the United States exploring expedition to the S. seas; but, as a long delay took place before it was ready to sail, he resigned his post in 1837. He was afterward elected Professor of Botany in the University of Michigan, but declined the appointment, and in 1842 became Fisher Professor of Natural History at Harvard. In 1873 he retired from the chair, but still retained charge of the great herbarium he had presented to the university in 1864; and in 1874 he succeeded Agassiz as a regent of the Smithsonian Institution. He ranked among the leading botanists of his age, and became an influential supporter of the Darwinian theories of evolution. He wrote: "Flora of North America" (begun with Dr. Torrey, in 1838); "Flora of North Eastern America, Illustrated" (1848–1850); memoirs on the botanical results of several government exploring expeditions; a number of text-books; "A Free Examination of Darwin's Treatise" (1861); "Darwinia" (1876); and "Natural Science and Religion" (1880). He died in Cambridge, Mass., Jan. 30, 1888.

Gray, Elisha, an American inventor; born in Barnesville. O., Aug. 2, 1835; was educated at Oberlin College. He designed a self-adjusting telegraph relay in 1867 and a little later invented the telegraphic switch and annunciator for hotels, the telegraphic repeater, the private telegraph line printer, etc. In 1876 he claimed the invention of the telephone, but after a notable contest the courts decided in favor of Alexander Graham Bell. In 1893 Professor Gray brought out his telautograph, by which written messages could be transmitted over the telephone and the telegraph. He was the founder of the Gray Electric Company in Highland Park, Ill., and in 1893 organized and was chairman of the Congress of Electricians at the World's Columbian Exposition. His publications include "Experimental Researches in Electro-

Harmonic Telegraphy and Telephony" (1878) and "Elementary Talks on Science." He died in Newtonville, Mass., Jan. 21, 1901. See BELL, ALEXANDER GRAHAM.

Gray, George Robert, an English naturalist; born in London, England, July 8, 1808. He was senior assistant in the zoölogical department of the British Museum and the author of a large and important illustrated work, the "Genera of Birds" (1849). He died May 5, 1872.

Gray, Horace, an American jurist; born in Boston, Mass., in 1829; was graduated at Harvard in 1845, and its law school in 1849; admitted to the bar in 1851; appointed reporter of the Massachusetts Supreme Court in 1854, and served till 1862; associate-justice of the Massachusetts Supreme Court, 1864–1873, and chief-justice, 1873–1881, when he was appointed successor to Judge Clifford in the United States Supreme Court. He died Sept. 15, 1902.

Gray, John Edward, an English naturalist, brother of George R. Gray; born in Walsall, Staffordshire, England, Feb. 12, 1800. He was educated for the medical profession. After assisting his father, author of "Supplement to the Pharmacopœia," in the preparation of his "Natural Arrangement of British Plants" in 1821, he entered in 1824 the British Museum as assistant in the Natural History Department, and in 1840 was appointed keeper of the Zoölogical Collections, a post which he retained till 1874. To him belongs the merit of having made the zoölogical collections of the British Museum the most complete in the world. He published excellent catalogues of the British Museum collections; "Illustrations of Indian Zoölogy" (1830–1835); "The Knowsley Menagerie and Aviary" (1846–1860). He also assisted in the formation of some of the most prosperous scientific societies of London, and was a vice-president of the Zoölogical Society. He died in London, March 7, 1875. His wife, MARIA EMMA, wrote "Figures of Molluscous Animals for the Use of Students" (1842–1857).

Gray, Joshua, an American inventor; born in Sheffield, Vt., May 4, 1824; received a common school education; became connected with the Manchester (N. H.) Locomotive Works, and while there designed a system of quick-steaming boiler tubes. His other inventions include the rubber-tipped lead pencil, a breech-loading magazine rifle, a seven-armature dynamo, a railroad signal, and a sewing machine shuttle. He died in Medford, Mass., June 25, 1899.

Gray, Thomas, an English poet; born in London, England, Dec. 26, 1716. He was educated at Eton, and Peter House, Cambridge, and entered at the Inner Temple, with a view of studying for the bar. Becoming intimate, however, with Horace Walpole, he accompanied him in his tour of Europe; but they parted at Reggio, and Gray returned to England in 1741. Here he occupied himself several years in literary schemes, which he admirably commenced, but wanted energy to mature. So slow was he to publish that it was not till 1747

THOMAS GRAY.

that his "Ode on a Distant Prospect of Eton College" appeared; and it was only in consequence of the printing of a surreptitious copy, that, in 1751, he published his "Elegy Written in a Country Churchyard." He declined the office of laureate on Cibber's death in 1757; and the same year published his odes "On the Progress of Poesy" and "The Bard." In 1768 the Duke of Grafton presented him with the Professorship of Modern History at Cambridge. He was a man of extensive acquirements in natural history, the study of ancient architecture, etc.; his correspondence places him among the best English epistolary writers; and some of his posthumous pieces afford proof of his profound and varied erudition. He died in Cambridge, England, July 30, 1771.

Gray, Thomas, an American educator; born in Lochgelly, Scotland, Feb. 4, 1850; was graduated at Glasgow University in 1878; instructor of electric engineering in the Imperial College of Engineering, Tokio, Japan, in 1879–1881; and represented the engineers, Lord Kelvin and Prof. Fleming Jenkin during the manufacture and placing of the Mackay-Bennett cable.. Later he was made director of the Department of Mechanics and Electrical Engineering in the Rose Polytechnic Institute, of Terre Haute, Ind. He was author of "Directions of Seismological Observations" in the "British Admiralty Manual of Scientific

Inquiry," articles on "Telegraphs" and "Telephones," in the "Encyclopædia Britannica"; the "Smithsonian Physical Tables"; etc. He died Dec. 19, 1908.

Graybeard, the name given to a large earthen jar, or bottle, for holding wine or spirituous liquor. Originally applied to a kind of stoneware drinking jugs, with bearded faces on them in relief, introduced in the early part of the 16th century.

Gray Cast-iron, cast-iron containing carbon chemically combined, and also graphite in a free state. When gray cast-iron is treated with an acid, the graphite separates out in black scales.

Graydon, James Weir, an American inventor; born Jan. 18, 1848; was graduated at the United States Naval Academy; served throughout the Civil War in the Union army under Sherman and Grant; was later promoted lieutenant in the navy, and resigned. His inventions include a dynamite gun; the gigantic wheels; an aërial torpedo; a system of torpedoes; and a railway carriage heater, all bearing his name.

Gray Fibers, in anatomy, pale gray fibers found with or without white ones in the sympathetic or other nerves; they were first discovered by Remak, and are often called after his name.

Gray Friars. See FRANCISCANS.

Grayling, a genus of fresh-water fishes in the salmon family, distinguished from trout, etc., by the smaller mouth and teeth,

GRAYLING.

and by the long, many-rayed dorsal fin. The genus is represented by five species, inhabiting clear streams in North Europe, Asia, and North America. The British grayling has a wide but local distribution; it prefers rivers with rocky or gravelly bottom and an alternation of stream and pool. The back and sides are silvery gray, with longitudinal dusky streaks; the dorsal fin is crossed by rows of spots. The fish, which may attain a weight of 4 to 5 pounds, is esteemed for the table, but should be cooked when newly caught, when it has an odor compared to that of wild thyme. It spawns in April or May, and is in best condition when trout are out of season, in October and November. Another well-known species is *Th. signifer*, a beautiful fish from the affluents of the Mackenzie river, called "Hewlukpowak," or "fish with the winglike fin," by the Eskimos, and "poisson bleu" by the Canadian voyageurs.

Gray Owl, the tawny-owl of Northern Europe and of North America.

Gray's Inn, one of the four Inns of Court, in London.

Gray's Peak, a peak in the Colorado range, in Colorado, and one of the highest in the Rocky Mountains. Its height is 14,341 feet.

Grazer, an animal that grazes or feeds on grass. Also the rendering of the Greek word *Boskoi* = herdsmen, given by Sozomen as the name of an order of monks which arose in the 5th century in Mesopotamia, and spread to Palestine. They are said to have fed on herbs, and gone about almost in a state of nudity.

Grazing Angle, in fortification, the angle, of 10° or less, of a glacis, at which a shot will not penetrate, but will glance from the surface.

Grazing Fire, in fortification, a fire when the trajectory is low, and the projectile strikes the object, whether vertical or horizontal, at a grazing angle. Used in howitzer batteries in the third parallel, to enfilade the covered way; ricochet fire.

Grazioso (grät-sē-ō′sō), in music, a sign or direction that the notes or passage to which it is prefixed must be played with grace and elegance.

Grazzini, Antonio Francesco (grät-sē′nē), an Italian humorist and poet; born in Florence, Italy, March 22, 1503. Of much native humor, he graduated from apothecary to writer of literary burlesques. He was one of the founders of the celebrated Florentine Academy; was expelled in consequence of a disputed question of grammar, and established the renowned ACCADÈMIA DELLA CRUSCA (*q. v.*). His literary reputation rests on his "Suppers," written on the model of Boccaccio, and vastly popular at one time. Seven highly amusing comedies, of a not high literary flavor, and a burlesque poem, "The War of Monsters," complete the list of his remembered achievements. He died in Florence, Feb. 18, 1584.

Grease, in mineralogy, a term used in relation to luster; fat quartz has a greasy luster. In farriery, a swelling and inflammation of the legs of a horse, attended with the secretion of oily matter and cracks in the skin.

Great Basin, a remarkable triangular plateau of North America, occupying the W. portion of Utah and nearly the whole of Nevada, as well as a section of Oregon and

California, and extending at its N. E. angle into Idaho. It is bounded on the W. by the Sierra Nevada, and on the E. by the Wahsatch Mountains. The base of the triangle, in the N.. is some 500 miles from E. to W.; it extends from N. to S. for nearly 800 miles, and its area is slightly greater than that of France. It is girdled round on every side by high mountains, and traversed throughout by numerous ranges, frequently parallel, yet as often irregularly blending or crossing; the valleys are usually sinks, the chief drainage center being GREAT SALT LAKE (*q. v.*), and the Humboldt and Carson sinks, at about the same elevation. It has been pointed out by the United States Geological Survey that the Great Basin's areas of greatest depression are to be found near the borders, while its central portion reaches a much greater elevation. The loftiest range is the East Humboldt, near the middle, which culminates in Mount Bonpland (11,321 feet). Volcanic masses form or conceal the original rocks of many of these ranges. The Great Basin contains many streams and lakes, the latter for the most part salt, whose waters never reach the ocean, but are either taken up by evaporation or sink in the desert sands. The mean annual rainfall ranges in different localities from 4 to 15 inches. The plateau is nearly destitute of trees, and in general only the upper parts of the valleys are clothed with desert shrubs, their lower portions often being occupied either by bodies of water or by a muddy bottom covered with several inches' depth of alkaline salts left by evaporation.

Great Britain and Ireland, United Kingdom of. See BRITISH EMPIRE.

Great-circle Sailing, a system of navigation first introduced by John Towson of navigating a ship on the principle that the shortest path between any two places on a globe is by the great circle drawn on it between them; the shortest course between two places on a sphere.

Great-eared Tribes, a name sometimes employed to designate savage races who disfigure themselves by stretching their ears to an enormous size with what may be called exaggerated earrings. In this case the lobes are stretched into pendent fleshy loops; but the savages by no means answer the description of Pliny's Panotii "whose ears were large enough to be used for covering their bodies." As a matter of fact the name Oregon is only a corruption of the Spanish *Orejones* (Big-ears), a nickname jocularly conferred on the inhabitants from their practice of enlarging the lobes of their ears.

Great Desert. See SAHARA.

Great Eastern, an English iron steamship, before the "Celtic," the largest vessel constructed, built (1854–1858) at Milwall, on the Thames, for the Eastern Steam Navigation Co., by Scott Russell, from plans by I. K. Brunel; length 680 feet; breadth, 82½, or, including paddle-boxes, 118 feet; height, 58 feet (70 to top of bulwarks). She had 6 masts, 5 of iron and one of wood, and could spread 7,000 yards of sail, besides having 8 engines, divided between her screws and paddles, and capable of working at 11,000 horse power. From the first her career was unfortunate, the launching process alone lasting three months and costing $300,000. After several unremunerative trips to New York she was employed first as a troopship, and then as a cable-laying ship, for which her size and steadiness specially qualified her. Various attempts were afterward made to utilize her, but she at last came to be a mere holiday spectacle, and was broken up in 1888.

Greater Britain, the entire territory subject to the English crown, including the colonial dependencies of the British Empire; in area these many times surpass the mother country.

Great Fish River. (1) In Cape Colony, a river rising in the Sneeuwberg Mountains, and, after a generally S. E. course of 230 miles, entering the Indian Ocean in latitude 33° 25′ S. and longitude 27° E. The Midland railway skirts part of the river; and Fish River Station is 207 miles from Port Elizabeth. (2) Great Fish river, or Back's river, in North America, enters an inlet of the Arctic Ocean in lon. 95° W., after passing through Lake Pelly.

Great Island, an island in Bass's Straits, between Australia and Tasmania; 40 miles long, 12 miles broad; pop. 41,000. Also an island and lighthouse at the entrance of Portsmouth harbor, N. H.; it exhibits a fixed light 90 feet above the sea-level.

Great Kanawha ka-nâ′wä), an affluent of the Ohio river called New river in the upper part of its course, and rising in the Blue Ridge of North Carolina; it has a course of 450 miles, and is navigable to a fall 30 miles above Charleston, and about 100 miles from its mouth.

Great Lakes, the name given to that chain of lakes lying on the N. borders of the United States; they include Lakes Superior, Michigan, Huron, Erie, and Ontario.

Great Malvern. See MALVERN, GREAT.

Great Mother, the earth. Junius Brutus and the sons of Tarquin consulted the oracle of Delphi in order to learn who should succeed Superbus on the throne of Rome. They received as answer: "He who shall first kiss his mother." The Tarquins hastened home to fulfill the apparent meaning, but Brutus fell to the ground, ex-

claiming, "Thus I kiss thee, O earth, the great mother of us all!"

Great Organ, one (and the most important) of the three organs which are most usually associated in large combined organs. They are the great-organ, the choir-organ, and the swell; to which may be added the pedal-organ or foot-keys for acting on the larger pipes. The key-board of the great-organ contains the principal keys, and has the middle position, the swell having the next highest row and the choir the lowest.

Greatrakes, Valentine, sometimes called GREATOREX and GREATARICK, an English healer, called the "touch doctor"; born in Affane, near Lismore, county Waterford, Ireland, Feb. 14, 1628. During the troubles of the Rebellion his mother fled in 1641 to England, and settled in Devonshire. From 1649 till 1656 he served as an officer in the parliamentary army, and from 1656 till the Restoration he acted as a magistrate in his native place. About 1661 he began "touching" for the king's evil, and ere long he touched or "stroked" for ague and for all manner of disease. He was summoned to the king at Whitehall; multitudes flocked to him, and his cures were witnessed and attested by men so eminent as Robert Boyle, Ralph Cudworth, and Henry More. In 1666 he published his "Brief Account" of himself and his cures. He seems to have died in 1682.

Great Rock of Italy. See GRAN SASSO D'ITALIA.

Great Salt Lake, in Utah, a sheet of water stretching along the W. base of the Wahsatch Mountains, about 4,200 feet above the sea, forming a principal drainage center of the GREAT BASIN (*q. v.*). Well-marked shore-lines on the mountains around, reaching 1,000 feet higher than the present level, show that the lake had formerly a vastly greater extent; this prehistoric sea has been named Lake Bonneville. Great Salt Lake is over 80 miles long and from 20 to 32 broad, but for the most part exceedingly shallow. It contains several islands, the largest, Antelope Island, about 18 miles long. Its tributaries are the Bear, Ogden, Jordan, and Weber, the Jordan bringing the fresh waters of Lake Utah; but Great Salt Lake has no outlet save evaporation, and its clear water consequently holds at all times a considerable quantity of saline matter in solution; in 1850 the proportion was 22.4 per cent., in 1869 it was only 14.8. Between these dates the annual tribute exceeded the evaporation, and the area of the lake increased from 1,700 to 2,360 square miles; more recently, it has again been slowly receding. Several species of insects and a brine-shrimp have been found in its waters, but no fishes; large flocks of water-fowls frequent the shores. The first mention of Great Salt Lake was by the Franciscan friar Escalante in 1776, but it was first explored and described in 1843 by Frémont. A thorough survey was made in 1849–1850 by Capt. Howard Stansbury, U. S. A. See SALT LAKE CITY: UTAH.

Great Sandy Island. See FRASER.

Great Seal of England. See SEAL.

Great Slave Lake, a body of water in the Canadian Northwest Territory (62° N. lat.); greatest length about 300 miles, greatest breadth 50 miles. By the Slave river it receives the surplus waters of Lake Athabasca; and it discharges by the Mackenzie river into the Arctic Ocean. See ATHABASCA.

Great Smoky Mountains. See SMOKY MOUNTAINS.

Great South Bay, an arm of the Atlantic Ocean on the S. coast of Suffolk co., Long Island, N. Y.; 50 miles long, from 1½ to 5 miles wide. Great South Beach, which is about 35 miles long, and has Fire Island Lighthouse on the W. extremity, separates it from the ocean.

Great St. Bernard. See ST. BERNARD.

Great Thirst Land, The, South Africa, so named by travelers because of its liability to frequent and lengthy droughts, no rain falling, sometimes, for 12 months.

Great Wall of China. See CHINA.

Greaves, armor for the legs made of metal, and lined with some soft material. They were fastened with straps and ankle-rings, and were richly ornamented and embossed.

Greaves, the sediment or insoluble parts of tallow gathered from the melting pots and made up into cakes for dog's food.

Grebe, the common name of the birds of the genus *Podiceps*, family *Colymbidæ*, characterized by a straight conical bill, no tail, tarsus short, toes flattened, separate, but broadly fringed at their edges by a firm membrane, and legs set so far back that on land the grebe assumes the upright position of the penguin. The geographical distribution of the genus is very wide, these birds haunting seas as well as ponds and rivers. They are excellent swimmers and divers; feed on small fishes, frogs, crustaceans, and insects; and their nests, formed of a large quantity of grass, etc., are generally placed among reeds and sedges, and rise and fall with the water. Five species are British, the great crested grebe (*P. cristātus*), the little grebe or dabchick (*P. minor*), the Sclavonian or horned grebe (*P. cornutus*), the red-neck (*P. rubricollis*), and the rare eared-grebe (*P. auritus*). The three last are winter visitors, but the two first remain all the year. Nine species are North Ameri-

can, some of them (crested grebe, horned grebe) being the same as those of Europe. The great crested grebe is about 21 to 22 inches long, and has been called satin grebe from its beautiful silvery breast-plumage, much esteemed as material for ladies' muffs.

Grecian Architecture, the styles of architecture which prevailed in Greece and its colonies up to the conquest of the country by the Romans. The oldest examples which now remain belong to that type which is known under the name CYCLOPEAN (*q. v.*). The earliest information respecting the architecture of Greece is gained from the poems of Homer. From him we learn that the palace was surrounded by Cyclopean walls, and had an outer and an inner court, the latter being surrounded by porticoes and chambers. This led to a large columnar hall for festive purposes. The chambers for the family and women were behind. Treasure-houses often existed in connection with the palaces, for the preservation of valuables. In plan these treasure-houses were circular, and the covering was dome-shaped. Of all that remain to this day, that of Atreus, at Mycenæ, is the most remarkable. The earliest style of regular architecture was that known as DORIC (*q. v.*), which is characterized by simplicity and strength. The oldest example of it is a temple at Corinth. The IONIC (*q. v.*) order of architecture arose much about the same time, *i. e.*, about 600 B. C. Its characteristic features are grace and delicacy. To it belonged the temple of Diana, at Ephesus. About the beginning of the 5th century B. C. the CORINTHIAN (*q. v.*) order began to come into use. It differs little from the Ionic except in greater lightness and increased richness of decoration. In spite of all differences of form and character of the details, the entire structure in their orders rests on the same principles. The use of the column is the great characteristic of all, and the differences between the three orders is most clearly perceptible in its treatment. The arch was never used in Grecian architecture.

Greco=Turkish War, The, a war which took place between Greece and Turkey in 1897. On Feb. 3, 1897, the Turkish troops in Crete wantonly pillaged and massacred a large number of Christians. About 15,000 Greek women and children fled to Greece, where the people had to provide for them. In the meantime the Cretans proclaimed their independence of Turkey, their union with Greece, and appealed to that country for help. This action led King George of Greece to send a small army to occupy the island, a movement which was opposed on the part of the Powers by whom the island was blockaded March 17, 1897. After a demand was made that the Greek troops be withdrawn from Crete, which was not complied with, the Powers landed soldiers and occupied the island. Soon afterward a body of Greek "irregulars" invaded Macedonia, whereupon the Turkish cabinet declared on April 17 that a state of war existed with Greece, and Edham Pasha, commander of the Turkish army, was ordered to take the offensive.

This issue was promptly accepted by Greece, and hostilities were at once begun on the Grecian frontier, which soon developed into a general cannonading along the entire frontier of Thessaly, while operations were likewise initiated on the sea. The Greeks, fighting their way northward, invaded Turkey and threatened Alassona, while the Turks swept down from Salonica through the mountain passes and invaded Greece, thus forcing the Greeks to abandon Larissa, their principal source of supplies. In the meanwhile the Greek navy was active, having bombarded and destroyed a number of important towns along the Gulf of Salonika. During the latter part of April and the beginning of May the Greeks were mainly victorious. A Grecian army of 12,000, under General Smolenski, repulsed a Turkish force of 14,000, with heavy loss, near Velestino, on April 30, and held in check another movement, May 2.

The tide, however, was soon turned, for on May 5 the Turks, with 50,000 men, compelled an army of 23,000 Greeks to withdraw from Pharsalos. The Greeks now became aware that they could not cope with the constantly increasing Turkish army, and this conviction with the knowledge that the country was without funds, disheartened the soldiers and caused the army to collapse. On May 8 the Powers were informed that the Greek troops would be recalled from Crete, thus signifying that Greece was ready to be guided by the Powers.

On May 11 a joint note was sent to the Greek minister of foreign affairs offering mediation, and on May 12 a request for an armistice was sent to the Turkish government. Four days later that country replied that it would not allow an armistice except on the following conditions: Annexation of Thessaly; an indemnity of £10,000,000; abolition of the capitulations or treaties conferring privileges on Greeks in the Turkish empire; and a treaty of extradition with Greece. These harsh terms met with a protest from all Europe. The Czar of Russia now wrote a personal letter to the Sultan, with the result that hostilities immediately ceased, and on May 20 an armistice for 17 days was concluded.

The question of the cession of Thessaly was referred to a military commission,

which recommended no cession beyond the mountain summits on the Turkish frontier, which gave to Turkey a strategic boundary. Negotiations were finally concluded on Sept. 18, when a treaty was submitted to Turkey and Greece. The principal terms of this treaty were that Greece should pay Turkey about $15,000,000; permit a strategic reconstruction of the Thessalian frontier in Turkey's favor; and accept international control in financial matters. This treaty was signed at Constantinople, Dec. 4, 1897.

***Greece, Ancient.** The name of *Græcia* originated in Italy, and was probably derived from Pelasgian colonists who, coming from Epirus and calling themselves Græci, occasioned the application of this name to all the people who spoke the same language with them. In earlier times, for example, in the time of Homer, Greece had no general name among the natives. It afterward received the name of Hellas, and still later, after the country was conquered by the Romans, the name of Achaia. The Grecian tribes were so widely dispersed that it is difficult to determine with precision the limits of Greece, properly so called. The name is properly applied only to the country lying to the S. of Macedonia, with the adjacent islands; but it has sometimes been given by modern geographers to the whole territory lying to the S. of Mount Haemus, Mount Scomius and the Illyrian Alps, or the whole series of mountains now called the Balkan, so as to include regions inhabited by some Thracian, Macedonian, and Illyrian tribes. The area of the mainland of the more limited region to which the name of Greece is properly confined is reported at 25,014 square miles.

Physical Features.— Taken in the narrower acceptation of the term, the first thing which strikes the eye on looking at a map of Greece is the comparatively great extent of its coast line, formed by numerous gulfs which penetrate into it in all directions, and give it a remarkably broken and rugged appearance. Proceeding around the coast from the N. W. to the N. E. we are presented in succession with the Ambracian Gulf (now Gulf of Arta), Corinthian Gulf (the mouth of which is now called the Gulf of Patras, while the name of Gulf of Corinth is reserved for the inner part of it), the Cyparissian (now Arcadian) Gulf, and the Messenian, Laconian, Argolic, Saronic, Maliac, and Pagasæan Gulfs, now called respectively Koron, Kolokythia or Marathon, Nauplia, Athens or Ægina, Molo or Zeitouni, and Volo. The Corinthian Gulf on the E. and the Saronic Gulf on the W., which nearly meet at the Isthmus of Corinth, divide Greece into a continental and a peninsular portion, the latter called the Peloponnesus (now Morea). Another striking feature is the mountainous character of the interior. The whole country to which we have restricted the name of Greece was bounded on the N. by a range of mountains, the W. half of which was called Mount Lingon and the E. half the Cambunian mountains, and Mount Olympus at their E. extremity. From about the middle of this range a lofty chain called Mount Pindus, strikes S. and runs almost parallel to the E. and W. coasts of Greece. At a point in this chain, called Mount Tymphrestus or Typhrestus (now Mount Velukhi), two chains proceed in an E. direction, the extreme N. of which, Mount Othrys, runs almost due E. and attains at some points a height of from 7,000 to 8,000 feet, while the S. one runs rather in a S. E. direction, attaining at one point a height of 8,240 feet, and terminates at the celebrated pass of Thermopylæ. The Cambunian mountains on the N., the range of Pindus on the W., and Othrys on the S., inclose the large and fertile vale of Thessaly, forming the basin of the Peneus (now Salambria), and the ranges of Othrys and Oeta inclose the smaller basin of the Sperchius (Hellada). Another range of mountains branches off from Mount Œta and runs still more to the S. This is the celebrated Parnassus which, at its highest point, exceeds 8,000 feet. The peaks of Cithæron, Parnes, Pentelicus, and Hymettus lie in the same direction, but are more distinguished for their classic celebrity than for their height. The range in which these peaks are found is continued to the S. E. point of Continental Greece, and the islands of Ceos, Cythnos, Seriphos, and Siphnos (now Zea, Thermia, Serpho, and Siphanto) may be regarded as continuations of it. This range on the S. and that of Œta on the N. inclose the basin of the Cephissus, with Lake Copais (now drained). Another chain of mountains strikes to the S. W. from the central range of Continental Greece, under the names of Corax and Taphiassus. The chief rivers W. of the Pindus chain are the Arachthus (now Arta) and the Achelous (now Aspropotamo).

The chief feature in the mountain system of the Peloponnesus is a range or series of ranges forming a circle round the valley of Arcadia in the interior, having a number of branches proceeding outward from it in different directions, dividing the rest of the Peloponnesus into several other valleys. The loftiest part of the mountainous circle around Arcadia is that lying to the N., with the peak of Cyllene (Zyria), 7,788 feet high at its E. extremity, and Erymanthus (Olonos), 7,297 feet high at its W. The S. part consists rather of a series of heights than a chain of mountains. The highest range which branches off from the circle around Arcadia and indeed the highest range in the Pelponnesus is Mount Taygetus, which strikes S., separating the ancient di-

*For Map, see TURKEY.

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visions of Messenia and Laconia, and terminating in the promontory of Tænarum (now Cape Matapan). The other chains are of no importance. The only rivers in the Peloponnesus of any consequence are the Eurotas (Basilipotamo), draining Laconia on the S. E.; the Pamisus (Pirnatsa), draining Messenia on the S. W.; the Alpheus (Ruphia), draining Arcadia and Elis; and the Peneus, draining Elis on the W.

Divisions.— On the N. W. of the mainland of Greece was the mountainous region of Epirus, and to the E. of that district, separated from it by the chain of Pindus, lay Thessaly. Neither of these divisions contained any towns of importance. To the S. lay a series of small independent States. Reckoned from W. to E., there were Acarnaria, Ætolia, Doris and Locris, Phocis with Mount Parnassus, the seat of the Muses, and the sacred Delphi, regarded by the Greeks as the navel of the earth; Bœotia, with Helicon, another mountain sacred to the Muses, and with the cities of Thebes and Platæa; Magaris, containing the city of Megara; and Attica with its capital Athens, Piræus, the port of Athens, and the city of Eleusis, the seat of the mysterious worship of Demeter. In the middle of the Peloponnesus was Arcadia, with the towns of Mantinea, Tegea, and Megalopolis, the last founded by the advice of Epaminondas at a comparatively late epoch in Greek history. In the N. lay Sicyon and Corinth, the latter situated on the isthmus connecting the Peloponnesus with the rest of Greece; and to the W. of that Achaia. To the S. W. of Achaia lay the rich province of Elis, with the plain and sacred grove of Olympia, celebrated on account of the Olympic games, which were held here every fourth year. To the S. of Elis, in the S. W. corner of the Peloponnesus, lay the province of Messenia, with the famous stronghold of Ithome, "one of the horns of the Peloponnesus," the fort of Pylos, and later the town of Messene, founded by the advice of Epaminondas. Separated from Messenia by the range of Taygetus was the province of Laconia, occupying the S. E. corner of the Peloponnesus, and containing the renowned city of Sparta, long the rival and ultimately the conqueror of Athens. Lastly, to the N. of Laconia, the E. of Arcadia, and the S. of Sicyon, lay the province of Argolis, with the capital Argos, and the cities of Mycenæ and Tiryns, all remarkable for the remains of gigantic works of masonry, commonly known as Cyclopean works.

The islands of Greece are partly scattered over the Ægean Sea and partly contained in the Ionian Sea on the S. W. of the mainland. The Greeks applied the names of Cyclades and Sporades to two groups of islands in the Ægean, the former name (from *kuklos*, a circle) to those which they believed to form a circle round the sacred island of Delos, and the latter (from *speiro*, I scatter) to those which were scattered over various parts of the sea. These designations were not used with any great degree of precision. Some islands were sometimes said to be in the one group and sometimes in the other, and several were sometimes excluded from both. The following, however, are the principal of those which may most properly be considered as belonging to the Cyclades: Andros, Tenos, Myconos, Naxos (now Naxia), Paros (celebrated for its marble), Amorgos, Anaphe, Thera (now Santorin), Pholegandros (now Polykandro), Sicinos, Ios (now Nio), Melos, Syros, and Gyaros (Jura), besides the four already mentioned, Siphnos, Seriphos, Cythnos, and Ceos. The name Sporades may be applied to all the other islands in the Ægean. The Sporades will thus include the following islands on the N. E. of the mainland of Greece:— Eubœa (Negropont), the largest of all the Greek islands, separated from the continent only by the narrow strait of Euripus, and containing the ports of Chalcis and Eretria; Sciathos, Scopelos, Halonesus (Kilidromi), Eudemia (Sarakino), and Scyros; the following off the coasts of Thrace and Asia Minor: Lemnos, Thasos, Imbros, and Samothrace (in very remote times the seats of a mysterious religious worship), Lesbos (with the flourishing and luxurious town of Mitylene), Chios, Samos, Cos, etc.; and the following in the Saronic Gulf, or between it and the Argolic Gulf: Salamis (now Salamis or Koluri), Ægina, Calauria (Poros), Hydrea (Hydra), and Tiparenus (Spezzia). The islands in the Ionian Sea are Corcyra (Corfu), celebrated in the most ancient times for its wealth and culture, and at a later period colonized by Corinthians; Paxos, Leucas or Leucadia (Santa Maura), at one time connected with the mainland; the "rocky" Ithaca (now vulgarly called Thiaki), the home of Ulysses; Caphallenia (Cephalonia), Zacynthus (Zante), and Cythera (Cerigo), one of the seats of the worship of the goddess Aphrodite.

Soil, Productions, etc.— Greece was in ancient times more fertile than it is now, which is accounted for by the fact that the forests have been to a large extent cleared away, and the springs thus dried up, and the soil deprived of moisture. The most fertile districts were Thessaly, Bœotia, and some parts of the Peloponnesus; the least fertile Attica and Arcadia. The principal objects of cultivation were the vine and the olive, but flax and the commoner cereals were also cultivated more or less. Among the domestic animals were horses, asses, mules, oxen, swine, sheep, goats, and dogs. Swine were very numerous everywhere, and mules were much used in the Peloponnesus; but there were comparatively few horses, as the mountainous character of the country

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was not conducive to their being reared; the best horses of Greece were reared in Thessaly. Bears, boars, and wolves are mentioned among the wild animals anciently found in Greece, and it may perhaps be inferred from the legend of the Nemean lion that even lions at one time existed in this country. Herodotus, indeed, expressly states that lions were found between the Nestus in Thrace and the Achelous in Acarnania.

Climate.— The climate of ancient Greece is highly commended by ancient Greek writers, as by Herodotus, Hippocrates, and Aristotle, on which account it seems fair to infer that the malaria which now infests the air in summer did not then prevail to the same extent, a circumstance that is easily accounted for by the fact that in those times the country was more thickly populated and better cultivated. In respect of temperature the same differences resulting from the inequalities of the surface must have existed then as exist now, long and severe winters being experienced in the highlands of the interior, while the lowlands, exposed to the sea, enjoyed warm and genial weather all the year round.

History.— The territory to which we have confined the name of Greece has never at any period formed a single and independent State. As long as it remained independent it was divided into a number of separate States, and during the only period when it was administered as a single territory it was subject to a foreign power. A general sketch of the history of ancient Greece like the present must therefore, for brevity's sake, avoid as much as possible going into details of the history of the several States, referring for information on that subject to the special articles, and must touch only upon those leading events which belong to the common history of the Greek States, or which at least affected the Greek people as a whole, even though they may belong more especially to the history of an individual State.

The earliest inhabitants of Greece of whom anything is known are called by Greek writers Pelasgians. The ethnological affinities of these have often been discussed, but the most recent authorities believe that they were a non-Aryan people, occupying not only Greece, but the islands and E. shores of the Ægean, and corresponding to the Iberians of Spain and Gaul, the Ligurians of North Italy, and probably to the modern Berbers of Northern Africa. Recent archæological discoveries, the result of the researches and excavations of Schliemann and later investigators, have proved that even as early as the 3d millennium B. C. they had developed a civilization of really advanced character, carried on an active trade by sea, and had commercial relations extending as far as the Danube and the Nile. At first we find them using only implements of stone, later they passed into their bronze and iron ages successively. Relics of these first inhabitants of Greece are still to be seen in the remains of ancient buildings, especially in the so-called Cyclopean works in the Peloponnesus, where the ancient ruins of Tiryns and Mycenæ in particular have yielded remains that shed a most instructive light upon the primitive civilization of Greece. The earlier relations of Greece with the East are perhaps reflected in the legends of Oriental colonists — Cadmus, Pelops, Cecrops, etc., — who settled in Greece in very remote times. At any rate the reality of an early connection between Greece and the East is established by the fact that the Greeks derived the greater part of their alphabet from the Phœnicians.

The Hellenes, or Greeks properly so called, entering the country probably from the N. W., subdued and partly displaced the Pelasgians. They are usually represented as having been divided into four chief tribes — the Æolians, occupying the N. parts of Greece (Thessaly, Bœotia, etc.); the Dorians, occupying originally only the small region in the neighborhood of Mount Œta; the Achæans, occupying the greater part of the Peloponnesus; and the Ionians, occupying the N. strip of the Peloponnesus and Attica. The middle part of the Peloponnesus was still mainly inhabited by a Pelasgic population. The warlike and enterprising character of these Hellenic invaders is evidenced by the poetic legends of their achievements in the heroic ages, such as the tale of the Trojan War, of Theseus, of Jason and the Argonauts, etc. From all these we may gather at least that the Hellenes early distinguished themselves by building towns, making long voyages, planting distant settlements, and carrying on foreign wars. As in later times, they were divided into numerous States, each consisting of a single city with the surrounding territory. These States were governed by kings who were the heads of the supreme families, and who traced their descent from Zeus. By the side of the kings stood the heads of the other leading families of the State, who in Homer are also called kings, and likewise boasted of a descent from Zeus. In the public market place (agora), where all the affairs of the State were transacted, these subordinate kings gave their opinions on every subject of deliberation and advised the supreme ruler as to the course he should pursue, but beyond that they had no authority. Their influence, however, was very great, especially where the rightful head of the State did not possess the abilities of a ruler.

The distribution of the Hellenic tribes which we have just indicated is not that which continued throughout the main period of Greek history. It was entirely altered

by an event called the Dorian migration, or sometimes the return of the Heracleids, which is placed by Thucydides about 80 years after the fall of Troy, and thus about the year 1104 B. C., according to the ordinary system of chronology. Before the great migration several smaller ones had taken place. One tribe, finding its territory too circumscribed, would move to another, expelling the inhabitants already settled there, who thus found themselves compelled to remove to some other district, where they treated the original inhabitants in the same way that they had been treated themselves. In this way there arose a general disturbance, till at last the hardy Dorian inhabitants of the mountainous region about Mount Œta began a migration on a greater scale than had hitherto been attempted, and thus brought about a series of changes which resulted in an entirely new settlement of the Greek territory. They first conquered a large part of Northern Greece and then entered and subdued the greater part of the Peloponnesus, driving out or subjugating the Achæans, as the Achæans had driven out or subjugated the Pelasgians. The Dorians are also said to have invaded Attica, where, however, they were baffled, according to the legend, by the self-devotion of Codrus, the king of that territory. It is said that an oracle had pronounced that in this war whichever side lost its king would be victorious, on which account strict orders were given to the Dorian soldiers to spare the life of the king of the enemy. But Codrus disguised himself in the dress of a common herdsman, and rushing into the thickest of the fight met his death, on learning which the Dorians despaired of success and withdrew. In the legend in which this series of events has come down to us the Dorians are represented as having entered the Peloponnesus under Temenus, Cresphontes, and Aristodemus, three descendants of Heracles, who had come to recover the territory of which their ancestors had been unjustly deprived by Eurystheus. Hence the name of the return of the Heracleids, which has been mentioned as sometimes given to this event.

The Achæan inhabitants of the Peloponnesus whom the Dorians found there had a threefold fate. One part of them sought new homes, and turned their steps toward the part of the Peloponnesus occupied by the Ionians, whom they expelled, keeping for themselves their territory, which hence received the name of Achaia. Another part voluntarily submitted to the invaders, who imposed tribute on them and excluded them from all share in the government; while a third part resisted to the last and were in the end reduced to the condition of slavery. In Laconia the former received the name Periœci (dwellers round), and the latter were called Helots.

The Ionians who were driven out of the Peloponnesus found at first a refuge among their kindred in Attica, but when this district did not suffice for all the inhabitants, old and new, large numbers of them left it and founded Ionic colonies on several of the islands of the Ægean Sea and on the middle part of the coast of Asia Minor, where they built 12 cities, which formed an Ionic Confederacy. The principal of these were Ephesus and Miletus. About the same time as the Ionians are said to have colonized the middle part of the seaboard of Asia Minor, another body of Greeks, proceeding from Thessaly and Bœotia are said to have founded the Æolian colonies on some of the N. islands of the Ægean, and on the N. part of the W. coast of Asia Minor. The Æolic colonies of Asia Minor also formed a confederacy of 12 cities, but the number was afterward reduced to 11 by the accession of Smyrna to the Ionic Confederacy. While Ionians and Æolians thus colonized the middle and N. islands of the Ægean and coasts of Asia, the S. islands and the S. part of the W. coast of Asia Minor were in like manner colonized by Dorian settlers. The six Doric towns in Asia Minor, along with the island of Rhodes, formed a confederacy similar to the Ionic and Æolic ones.

At this point it may be opportune to give a short account of the further development of Greek colonization, in order that we may not be obliged to return to the subject again. In the course of time new Greek settlements were made on the coasts of the Hellespont, the Propontis (Sea of Marmora), and the Black Sea, partly by emigrants from colonies previously founded, and partly by those coming direct from the mother country. The most important of these were Byzantium (Constantinople), Sinope, Cerasus, and Trapezus (Trebizonde). Further, there were flourishing Greek colonies on the coasts of Thrace and Macedonia; for example, Abdera, Amphipolis, Olynthus, Potidæa, etc.; and the Greek colonies in Lower Italy were so numerous that the inhabitants of the interior spoke Greek, and the whole region received the name of Greater Greece. The most famous of the Greek colonies in this quarter were Tarentum, Sybaris, Croton, Cumæ, and Naples. The island of Sicily also came to a great extent into the hands of the Greeks, who founded on it or enlarged many towns. By far the largest, most powerful, and most highly cultured of the Greek colonies was the Corinthian colony of Syracuse, founded in the 8th century B. C. On the N. coast of Africa the Greek colony of Cyrene rivaled in wealth and commerce the city of Carthage; and on the S. coast of Gaul that of Massalia (Marseilles) presented a model of civilized government to the inhabitants of the surrounding districts. All these towns kept up a commerce in the products of the land in which they were

planted, the environs were cultivated to the highest degree, and adorned for miles around with country houses and gardens. They exerted a most important and beneficent influence on the manners of the neighboring inhabitants, but in course of time degenerated when habits of luxury grew up with their increasing wealth. They preserved the customs and institutions of their mother city, which they regarded with filial reverence; but otherwise they were perfectly free and independent.

Although it was the case that, as has been stated, ancient Greece never formed a single State, the various Greek tribes nevertheless always looked on themselves as one people, and classed all other nations under the general name of Barbaroi (foreigners), which, at least in later times, always implied something of contempt. There were four chief bonds of union between the Greek tribes. First and chiefly they had a common language, which, though it had considerable dialectic peculiarities when spoken by different tribes, was yet understood throughout every part of Greece and in all the Greek colonies. Secondly, they had common religious ideas and institutions, and especially in the oracle of Delphi they had a common religious sanctuary, which fostered in all the same religious feelings and observances, which was held by all the States in equal reverence, and was resorted to from all parts of Greece (and even from foreign countries), alike by communities and individuals, for advice in circumstances of difficulty, and not infrequently for indications as to the future. Thirdly, there was a general assembly of the Greeks called the Amphictyonic League, in which the whole nation was represented by tribes (not by States), and the chief functions of which were to guard the interests of the sanctuary of Delphi, and to see that the wars between the separate States of Greece were not carried on in too merciless a manner. When any of the ordinances of the league were violated it was its duty to see that the violators were punished, and to intrust the infliction of the punishment to some one of its members. In spite of this, however, its ordinances were habitually violated without any steps whatever being taken on the part of the league to prevent or punish the offense. The fourth bond of union between the tribes of Greece consisted in the four great national festivals or games, the Olympian, Isthmian, Nemean, and Pythian, which were held at different intervals in four different parts of Greece, in which all Greeks, and none but Greeks, were allowed to participate, and which slaves were not allowed to even witness. At these games contests took place in foot racing and chariot racing, boxing, wrestling, and throwing with the quoit (or discus), and prizes were also awarded for works of art, poems, dramas, histories, etc.

The prize was a simple wreath of olive or pine branches, or of parsley; but the honor of gaining such a prize was so great that it brought glory not only on the winner himself, but on his whole family and kindred, and even on the State to which he belonged. The victor was welcomed home by a triumphal procession, and his victory was celebrated in odes sung on the occasion, and sometimes composed by the leading poets of Greece, as by Simonides and Pindar. The Olympic games were the most celebrated of these festivals. They were held in the summer once every four years; the month in which they were held was considered as sacred, and during it no acts of hostility were allowed to take place between any of the Greek States. Originally the only contest at these games was a foot race, and so high was the honor of a victory in this race esteemed that from that of Corœbus in 776 B. C. the whole of Greece reckoned the time. The year in which any event happened was called the first, second, third, or fourth year of a certain Olympiad, the name given to the interval elapsing between each celebration.

The various small States of Greece may be divided, according to the form of their constitution, into the two great classes of aristocratic and democratic. Sparta or Lacedæmon, the chief town of Laconia and of the Doric tribe, was the leading aristocratic State; and Athens, the capital of Attica and the chief town of the Ionic tribe, was the leading democratic State; and as a rule all the Doric States, and subsequently all those under the influence of Sparta, resembled that city in their constitution; and all the Ionic States, and those under the influence of Athens, resembled it. These two tribes or races are the only ones that come into prominence during the earlier part of Greek history subsequent to the Doric migration. Sparta is said to have derived its form of government and all its institutions, in the 9th century B. C., from Lycurgus, who made minute regulations as to the whole course of education and the mode of life among the Spartans. All these regulations had but one object, that of training the Spartan youth for war, and developing a hardy and warlike spirit among the people generally. The immediate results of this mode of training were seen in the conquests which the Spartans effected over the surrounding States, especially over the Messenians in the 8th and 7th centuries B. C. Many of the Messenians, after the disastrous termination of the second war, left their native country and founded the city of Messana in Sicily. Those who remained were reduced to the condition of Helots.

The constitution of Athens was not originally democratical. The legends of Theseus and Codrus make it quite certain that it was at first monarchical. Afterwards it

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became aristocratic, and first received a more or less democratic constitution from Solon at the beginning of the 6th century B. C. This was followed about 50 years later by a monarchical usurpation under the celebrated "tyrant" Pisistratus, and his sons Hippias and Hipparchus, the last survivor of whom, Hippias, reigned in Athens till 510 B. C. Hipparchus had been assassinated four years before in revenge for an insult offered to the sister of one of the conspirators; and the last four years of the reign of Hippias were distinguished by violence and cruelty, by which he estranged from him those by whose favor he had been enabled to maintain himself in his usurpation. This afforded an opportunity to his enemies to drive him from Athens, after which the republic was restored in a more purely democratic form that at first. These facts are mentioned because they had some effect in bringing on an event perhaps the most important in the common history of Greece during its most flourishing period.

Hippias, on being compelled to flee from Athens, found refuge at the court of the King of Persia, with whose aid he hoped to be able to return and rule once more in Athens. The Persian monarchy had been established about 30 or 40 years before by Cyrus the Great, and its sway, at the time of which we are now speaking, extended not only over the whole of Persia, Media, and Babylonia, but also over Egypt and Asia Minor. With the rest of this last-mentioned territory the Greek colonies on the coast had been brought under the yoke of this extensive empire, and though, accustomed to freedom, they chafed under the foreign dominion, they were nevertheless kept in subjection by the native princes or tyrants whom the Persian monarch imposed on them as governors. One of the most powerful of these governors was Histiæus of Miletus, whose behavior appears to have excited the distrust of Darius, the Persian king, for the latter on the pretence of rewarding him for a signal service which he had previously rendered him, invited him to his court and kept him there in splendid captivity. To rid himself of this restraint Histiæus secretly incited his relative, Aristagoras of Miletus, to incite a rising among the Greek colonies of Asia Minor, in the hope that he might during the disturbance find an opportunity of returning to his home. The endeavors of Aristagoras were successful; all the Greek towns on the coast were soon in arms, and assistance was asked from the mother country. Only Athens, which feared lest Darius should reestablish Histiæus, and the small town of Eretria in Eubœa, furnished any aid. At first the rising prospered. The Greeks, in 496 B. C., conquered and burned the town of Sardes, the capital of Asia Minor, whereupon the rebellion extended over the whole of Ionia. But fortune soon changed. The superior forces of the enemy, and the want of union among the insurgents, led in the following year (495) to the loss of a naval battle, and soon after to the destruction of Miletus, the inhabitants of which were partly put to death and partly made captives.

Darius now determined to avenge himself on the Athenians and Eretrians for the part that they had taken in the rising. In 492 he sent out an expedition against them under his son-in-law Mardonius, but the fleet which carried his army was destroyed in a storm off the promontory of Mount Athos. Darius had at the same time dispatched heralds to the islands and States of Greece to demand earth and water in token of submission. Most of the islands and many of the smaller States yielded, but Athens and Sparta indignantly refused the demand, and even went the length of putting the heralds to death. Enraged at this insult Darius equipped a second fleet for the subjugation of the refractory States and placed it under the command of Datis and Artaphernes. But this met with no better fate than the first. The Persians indeed reached their destination, landed on the island of Eubœa, and after destroying Eretria, crossed the Euripus into Attica; but here they were met (490 B. C.) on the plain of Marathon by 10,000 Athenians and 1,000 Platæans, under the great general Miltiades, and, although 10 times as numerous, were totally defeated and pursued to their ships. This battle put an end to the second Persian expedition, but Darius did not, on that account, give up the purpose of vengeance which he had conceived. He at once began to make preparations for a third expedition, and this time on a far greater scale than before. In the midst of these preparations he died, leaving his plans to be carried out by Xerxes, who entered into them with such eagerness, that according to popular tradition, he collected an army of 1,700,000 men and a fleet of 1,200 large ships besides a number of smaller ones. Having crossed the Hellespont in 481 by means of two bridges of boats, he led his army through Thrace, Macedonia, and Thessaly, while his fleet followed the line of coast. Thessaly had surrendered without a stroke, and Xerxes at once pursued his march in the direction of Phocis. But before he could enter this territory he had to make his way through the narrow and difficult pass of Thermopylæ, which has been mentioned in the description of the physical features of Greece as terminating the chain of Œta on the E.; and this had previously been occupied by 300 Spartans under Leonidas, along with several thousand allies. Here Xerxes for several days in succession in vain attempted with his mighty army to force a passage against what was in comparison a mere handful of Greeks; thousands of his troops

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were slain; and it was only after an infamous Greek, of the name of Ephialtes, had betrayed to the Persians a footpath which led over the heights of Œta to the rear of the defenders of the pass, that the Persian king effected his purpose. On hearing of the approach of the Persians on the rear, Leonidas allowed all the allies to depart, while he himself and his 300 Spartans, along with 700 Thespians who voluntarily remained with them, held out until they were completely annihilated. This took place in 480 B. C.

The way through Phocis and Bœotia was now open to the Persians, who traversed these territories, advanced into Attica, and laid the city of Athens in ruins, putting to death the small garrison that had been left behind to defend the citadel. The women and children belonging to Athens had by this time, on the advice of Themistocles, been removed to Salamis, Ægina, and Trœzen, while all the men capable of bearing arms served in the fleet. It was to the genius and courage of Themistocles that the deliverance of Greece was now chiefly due. The united fleet of the Greeks had already contended with success against that of the Persians off the promontory of Artemisium, and had then sailed into the Saronic Gulf, whither it was followed by the enemy. In this confined arm of the sea where there was no room for the maneuvering of the numerous ships of the enemy, it was the design of Themistocles that a decisive battle between the two fleets should take place. To prevent his design from being frustrated by the plan of the Spartan Eurybiades, who had been intrusted with the command of the whole fleet, and who wished to sail out of the gulf and proceed to the Isthmus of Corinth where he would have the support of the army, he secretly induced the Persians to make a sudden attack on the Greeks, in consequence of which a battle ensued with the result that Themistocles had anticipated, the total defeat of the Persians. This battle is known as the battle of Salamis, and was fought in the same year as Thermopylæ, 480 B. C.

From a neighboring height Xerxes himself had been an eye-witness of the destruction of his fleet, and at once began a speedy retreat with his land army through Thessaly, Macedonia, and Thrace, a retreat which Themistocles had hastened by causing the false report to reach Xerxes that it was the intention of the Greeks to destroy the bridges of boats over the Hellespont. Xerxes left behind him only 300,000 men in Thessaly. In the spring of the following year (479) these advanced into Attica and compelled the citizens once more to seek refuge in Salamis; but in the great battle of Platæa the Greeks, under the command of Pausanias, obtained so complete a victory that only 40,000 of the Persians reached the Hellespont. On the same day the remnant of the Persian fleet was attacked and defeated by the Greeks off Mount Mycale on the Asiatic coast.

The third and last Persian invasion of Greece thus failed as completely as the other two. By the brilliant part which the Athenians under Themistocles had taken in repelling this invasion the city of Athens had greatly increased her influence throughout the rest of Greece; and this was further strengthened by the fact that the war against Persia, which still continued, was chiefly conducted by sea, where Athens was much more powerful than Sparta. From this date then begins the period of the leadership or hegemony of Athens in Greece, which continued to the close of the Peloponnesian war, 404 B. C.. The first thing which Athens exerted her influence to effect was the formation of a confederacy including the Greek islands and maritime towns as well as Athens herself, the object of which was to supply means for the continuance of the war by the payment into a common treasury established on the island of Delos, of a fixed sum of money, and by furnishing a certain number of ships for the same purpose. In this confederacy Athens of course had the lead, and she gradually increased her power so much that she was able to render tributary many of the islands and several of the smaller maritime States. In 469 B. C. the series of victories won by the Athenians over the Persians was crowned by the double victory of Cimon, the son of Miltiades, over the fleet and army of the Persians on the river Eurymedon, in the S. of Asia Minor; and this victory was followed by the l onorable peace known as the peace of Cimon, which secured the freedom and independence of all Greek towns and islands. Shortly after followed the brilliant administration of Pericles during which Athens reached the height of her political grandeur, while at the same time she flourished in trade, in arts, in sciences, and in literature.

The position of Athens, however, soon raised up a number of enemies. Sparta regarded her prosperity with jealousy, and the arrogance and severity with which the Athenians treated the States which came under her power produced a general feeling of indignation and hatred. In the course of time two hostile confederacies were formed in Greece, both of which regarded war as inevitable, though both hesitated to begin. At the head of one of these confederacies was the city of Athens, which was joined by all the democratic States of Greece, and more or less supported by the democratic party in every State. At the head of the other confederacy stood Sparta, which was similarly joined by all the aristocratic States, and supported by the aristocratic party everywhere. At last in 431 war was

declared by Sparta on the complaint of Corinth that Athens had furnished assistance to the island of Corcyra in its war against the mother city; and on that of Megara, that the Megarean ships and merchandise were excluded from all the ports and markets of Attica; and thus began the Peloponnesian war which for 27 years devastated Greece in a terrible manner.

In the first part of the war the Spartans had considerable successes, which were aided by a great calamity which befell the Athenians. On the advice of Pericles the Athenians had collected all the inhabitants of the country districts of Attica within the walls of the city; and in consequence of the overcrowding thus produced a pestilence broke out which carried off thousands of the inhabitants, and, what added to the calamity, among them Pericles himself. From this blow, however, the city soon recovered and in 425 the early successes of the Spartans in Attica were compensated by the capture of Pylos in Messenia by the Athenian general Demosthenes, who at the same time succeeded in shutting up 400 Spartans in the small island of Sphacteria, opposite Pylos, where they were ultimately starved into surrender. The person to whom the surrender was made was the demagogue Cleon, who, although no credit was due to him for the result, boasted of it as a great military feat and in consequence obtained the command of an army which was sent to operate against the brave Spartan general Brasidas in Thrace. But in 422 he was defeated by Brasidas before the town of Amphipolis, and himself slain in the fight, after which the opposite party in Athens got the upper hand and concluded the peace with Sparta known as the peace of Nicias (421 B. C.)

The effect of this peace was to divide the Spartans and the Corinthians, who had hitherto been allies. The latter united themselves with Argos, Elis, and some of the Arcadian towns to wrest from Sparta the hegemony of the Peloponnesus. In this design they were supported by Alcibiades, a nephew of Pericles, a man of handsome figure and great personal accomplishments. The war which was now waged between Sparta on the one hand and Corinth and her allies on the other resulted, however, in favor of the former, whose arms were victorious at the battle of Mantinea in 418.

Soon after this the Athenians resumed hostilities, fitting out in 415 B. C. a magnificent army and fleet, which were placed under the command of Alcibiades, Nicias, and Lamachus, and were intended for the reduction of the Dorian city of Syracuse in Sicily. This undertaking, which renewed once more the hereditary hatred between Sparta and Athens, was, however, a complete failure. Alcibiades was accused in his absence by his enemies of several offenses

against religion and the constitution, and was therefore deprived of his command. Thirsting for revenge, he betook himself to Sparta and exhorted the city to renew the war with Athens. By his advice one Spartan army was dispatched to Attica, where it took up such a position as prevented the Athenians from obtaining supplies from the island of Eubœa, while another was sent under Gylippus to assist their kindred in Sicily. These steps were ruinous to Athens. The brave Lamachus fell in the siege of Syracuse, and in the harbor of the city the Athenian fleet was totally destroyed. The reinforcements sent out from Athens under Nicias and Demosthenes were attacked and defeated 413 B. C., by the combined Spartan and Syracusan armies. All the Athenians who escaped being slain in battle were made captives and in accordance with the savage mode of warfare which prevailed in all these internecine contests among the Greeks were compelled to work as slaves in the quarries of Sicily, though it may be mentioned as an interesting fact characteristic of the people among whom the war was carried on, that many of these captives, it is said, obtained their liberty by being able to recite fragments of Euripides.

When the news of this disaster reached Greece many of the allies of Athens fell away and joined the Spartans who now pressed on the war with greater energy both by land and sea. In their distress the Athenians recalled Alcibiades, who returned in 407 and was received by his fellow citizens with the warmest enthusiasm as their expected deliverer. A few months afterward, however, he was again an exile, having been deprived of the command of the Athenian fleet because one of his subordinates had lost a naval battle fought off Ephesus in his absence. During the rest of the war the Athenians had only one gleam of hope. This consisted in the naval victory won off the islands of Arginusæ over the Spartan Callicratidas in 406. In the following year (405) the carelessness of the Athenian commander enabled the Spartans to make themselves masters of the whole of the Athenian fleet except nine vessels while the majority of the crews were on shore at Ægospotamos on the Hellespont. The Spartans now easily subdued the islands and States that still maintained their allegiance to the Athenians, after which they laid siege to the city of Athens itself. In 404 B. C. the war was terminated by the Athenians being starved into surrender. Following the usual policy of a triumphant State in Greece, Sparta imposed upon Athens an aristocratic form of government, placing the supreme power in the hands of 30 individuals, who are commonly known as the "Thirty Tyrants." Only a year later, however, (403), Thrasybulus was able to overthrow this hated rule and reëstablish the democracy.

The period which follows the fall of Athens is that of Sparta's leadership or hegemony in Greece which lasted till the battle of Leuctra, in 371 B. C. The power that the Spartans now exercised was abused by them quite as much as the Athenians had abused theirs, and thus they as speedily roused the hatred and jealousy of the other States. The Greeks generally, or at least the members of those States which had up to this time been, and still continued to be, the leaders in Greece, had now lost almost entirely their former manliness and independent spirit, and the mutual rancor between the different States was now so great that they no longer had public spirit enough to maintain the hereditary war against Persia, but they each sought the aid of that power for their own purposes. The Spartans did indeed send an expedition under their King Agesilaus into Asia Minor, but it came to nothing; and the States of Greece, the Spartans included, at last in 387 agreed to the disgraceful peace of Antalcidas, by which the whole of the W. coast of Asia Minor was ceded to the Persians, and the Greek colonies there thus deprived of the independence that had been secured to them by the peace of Cimon.

An act of violence committed by a Spartan general in Thebes in 380, quite in the spirit of the usual behavior of Sparta, was what in the end led to the complete downfall of that city. The aristocratic party in Thebes, when the Spartan army happened to be in the neighborhood, prevailed on the general to give his assistance in overthrowing their opponents and establishing an aristocratic government. The leaders of the democratic party were, as usual in such cases, partly executed and partly placed in confinement, while a number of the less prominent members made their escape to Athens, where they had the support and assistance of the democratic party there. Encouraged by this party they soon returned in disguise to their own city, where they surprised and murdered the leaders of the aristocratic party, and expelled the Spartan garrison which had been left in the city, and again set up a democratic government. These circumstances are detailed here because, though they belong more to the history of Thebes than to that of Greece generally, they give a vivid idea of the fury of party strife which was then general in the Greek cities, and which recalls to mind the violence exhibited by the Guelph and Ghibelline parties in the cities of Northern Italy during the 13th and 14th centuries. The immediate result of this counter revolution in Thebes was a war with Sparta, the heroes of which were Epaminondas and Pelopidas, two disinterested patriots who were then at the head of affairs in Thebes. In the course of the war the Spartans invaded Bœotia, but were so completely defeated at Leuctra in 371 B. C. that they never fully recovered from the blow.

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With this victory Thebes won the leading place in Greece, which she maintained during the lifetime of Epaminondas, whose influence was paramount in the Peloponnesus. Here it was his policy to keep down the power of Sparta by strengthening the surrounding States. From him the Messenians recovered their freedom, and by his advice the cities of Arcadia formed themselves into a confederacy and built on a large scale the city of Megalopolis, which was to be at its head. This policy was at first successful, but in a few years the confederacy which he himself had originated and fostered began itself to strive after the supremacy and joined themselves with this object to the Spartans. Epaminondas then invaded the Peloponnesus to check their further efforts, but though the Thebans were again victorious, and totally defeated the Spartans and Arcadians in the battle of Mantinea in 362, yet the victory being won with the loss of their great general, the Thebans could no longer boast with justice of supremacy in Greece. Pelopidas had died two years before.

Two years after the death of Epaminondas, Philip, the father of Alexander the Great, became King of Macedonia. He was a man of great ability as a soldier and a ruler, an admirer of the Greek character, and a lover of Greek art and literature. He perceived, however, the weakness of the Greeks, arising from their utter want of unity, and eagerly looked for an opportunity of interfering in the affairs of their country, with the view of ultimately making himself master of it. An occasion for interference was furnished him by the war known as the Sacred War (355–346). This war arose from the Phocians having taken possession of some of the land belonging to the sanctuary of Delphi. The Amphictyonic League condemned the Phocians for this to pay a fine and restore the land they had taken, and when this was refused the league imposed on the Thebans the task of forcing the Phocians to submit to the demands of the league. The latter, however, in their rocky strongholds were able to resist all the efforts of their assailants, who at last called in the aid of Philip of Macedon. With this help the Phocians were subdued, when their towns were razed to the ground, and they themselves expelled from the league, and their place given to Philip.

It was not, however, till the Locrian war (339–338) that Philip acquired a firm hold in Greece. The Locrians had committed the same offense as that of which the Phocians had been guilty, and when they likewise refused to pay the fine that was for this reason imposed upon them by the league, Philip, as one of the members, received the charge

of punishing them for their disobedience. The advance of Philip was at first witnessed with comparative indifference by the other States of Greece, but when his real designs became apparent the Athenians, on the advice of their great orator Demosthenes, hastily concluded an alliance with the Thebans, and an army was sent out to oppose him. The battle of Chæronea which ensued (338) turned out, however, disastrously for the Greeks who saw their whole country laid at the feet of Philip. But the conqueror treated his new subjects with mildness, wishing to reconcile them to the Macedonian yoke, and being anxious also to win their favor before setting out on a new enterprise which he then contemplated and which he hoped to carry out with their coöperation. This enterprise was the invasion and conquest of the rotten empire of Persia, for which purpose he immediately set about collecting a large army, of which he had himself declared commander-in-chief by the Amphictyonic League in an assembly held at Corinth in 337 B. C.; but before he was able to start he was assassinated, 336 B. C.

The design of Philip was taken up and carried out by his son Alexander the Great, during whose absence Antipater was left behind as governor of Macedonia and Greece. Greatly as the Greeks had degenerated since the time of the Persian wars, they were yet far from willing to give up their freedom without a struggle, with whatever degree of mildness they might be treated by their conqueror, and however much he might hold them in esteem; and accordingly, soon after the departure of Alexander, Agis III. of Sparta headed a rising against Antipater. He was defeated, however, in the battle of Megalopolis in 330 B. C., and no other attempt was made by the Greeks to recover their liberty for nearly 100 years. At the close of the wars which followed the death of Alexander, and which resulted in the division of his empire, Greece remained with Macedonia.

The last efforts of the Greeks to recover their independence proceeded from a tribe which had not come into prominence since the heroic ages, namely, the Achæans in the N. strip of the Peloponnesus. This tribe is frequently mentioned by Homer as taking a very prominent part in the Trojan war; but during the historical period of Greece they for the most part kept aloof from the quarrels of the other States, and did not even furnish assistance to their brethren in repelling the Persian invasion. They had taken part, though reluctantly, in the Peloponnesian war on the side of Sparta and had shared in the defeat of Megalopolis in 330 B. C. In the course of the first half of the 3d century B. C. several of the Achæan towns expelled the Macedonians and revived an ancient confederacy which was now known as the Achæan League. About the middle of this century the league was joined by the town of Sicyon, the native city of Aratus, who soon after became its leading spirit. Through his influence it was joined also by Corinth, and then it began to aim at acquiring the supremacy throughout the Peloponnesus and even throughout the whole of Greece, as well as at delivering Greece from the Macedonian yoke. In following out the first of these aims Aratus and the league came into collision with Sparta, which at that time happened to be governed in near succession by two kings, Agis IV. (244–240) and Cleomenes (236–220), who had both something of the old Lycurgan spirit in them, and who desired to restore the Spartans to their former simplicity of manners and warlike disposition, and to raise them once more to their former political greatness. These, then, naturally looked with jealousy on the efforts of Aratus, and during the reign of Cleomenes a war broke out between Sparta and the Achæan League. The league was at first worsted, and was only finally successful when Aratus, forgetting the ultimate end of his efforts in the pursuit of that which he had more immediately in view, called in the aid of the Macedonians. In the battle of Sellasia, in 222 B. C., Cleomenes was defeated and compelled to take to flight, and the Macedonians became masters of Sparta. Aratus died in 213, and his place was taken by Philopœmen, "the last of the Greeks," who roused the league once more to vigorous efforts and gradually succeeded in making it in some degree independent of Macedonia.

About this time the Romans, whose power had been advancing meanwhile with rapid strides in Italy, and who had just come out victorious from a second war with Carthage, in which they had had to contend with Hannibal, one of the greatest military geniuses whether in ancient or modern times, found an occasion to interfere in the affairs of Greece. Philip V. of Macedon had allied himself during this war with Hannibal, and accordingly, as soon as the war was concluded, the Romans sent over Flamininus to punish him for so doing, and in this war with Philip the Romans were joined by the Achæan League. Philip was defeated at the battle of Cynoscephalæ in 197 B. C., and was in consequence obliged to agree to a peace, in which he recognized the independence of Greece. To gratify the Greek vanity Flamininus proclaimed the deliverance of Greece from the Macedonian yoke at a celebration of the Isthmian games in 196 B. C.; but the Greeks soon felt that they had only exchanged masters, that they were in reality, though not in name, as much in subjection to them as they had ever been to the Macedonians. On this account the Ætolians, who had formed a

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league similar to that of the Achæans, appealed for assistance against the Romans to Antiochus the Great, King of Syria, one of the kingdoms which had been formed out of the empire of Alexander. The appeal was listened to; but the help afforded was useless, for Antiochus was defeated in a bloody battle at Magnesia in Asia Minor in 190 B. C. The Ætolians were compelled to pay a money indemnity, and to sacrifice some of their art treasures.

By this time the Achæan League was unquestionably supreme over all other powers within Greece, having been joined by all the States of the Peloponnesus. But the league itself was in reality subject to Rome, the senate of which assumed the right of regulating its proceedings; and on one occasion, in 168 B. C., on the conclusion of a war waged by the Romans against Macedonia, the former carried off into Italy 1,000 of the noblest Achæans, on the pretext that they had furnished assistance to the Macedonians. Such was the posture of affairs till 147 B. C., when the league openly resisted a demand made by the Roman senate, that Sparta, Corinth, Argos, and other cities, should be separated from it, in consequence of which a war ensued, which was concluded in 146 B. C. by the capture of Corinth by the rude consul Mummius. It is generally stated that Greece was immediately erected into a Roman province with the name of Achaia, including probably the whole of Greece, except Epirus; but there are several circumstances that seem to render this doubtful, and the fact that the first governor of the province of whom any mention is known to have been made by classical writers, Servius Sulpicius, was appointed by Julius Cæsar makes it not improbable that it was Cæsar who first formed the province. However this may be, the independence of Greece was virtually gone with the fall of Corinth. From this date the prosperity of the cities of Greece rapidly declined, and the last sparks of the ancient Greek patriotism and love of independence became extinguished. The various cities still retained, however, something of the qualities for which they had been remarkable at the height of their glory. Athens was still one of the great centers of culture, and the cradle of all kinds of new speculations — the Athenians, as St. Paul says, and the strangers in Athens, "spent their time in nothing else, but either to tell, or to hear some new thing." Many left their native city and made a livelihood, though they gained little esteem, among the Romans, as artists and scholars, actors and dancers, poets and wits. The citizens of Sparta continued to gratify their thirst for warfare by serving as mercenaries in foreign armies. Corinth was still the home of luxury and vice.

From the date above mentioned Greece remained attached to the Roman empire. On the division of the Roman empire it fell of course to the E. or Byzantine half. From 1204 to 1261 it formed a part of the Latin empire of the East, and was divided into a number of feudal principalities. In the latter year it was re-annexed to the Byzantine empire, with which it remained till it was conquered by the Turks between 1460 and 1473. In 1699 the Morea was ceded to the Venetians, but was recovered by the Turks in 1715. For the history of the present kingdom of Greece, see GREECE, MODERN.

The history of ancient Greece has been written by various eminent scholars, Thirlwall and Grote being standard authorities, whose works appeared respectively in 1839-1844 and 1846–1850. Among more recent works are those by Abbott (1888–1892, 2 vols.), Curtius (English translation 1868–1873, 5 vols.), Holm (do., 1894–1898, 4 vols.). An excellent manual, giving recent results, is that of Professor Bury (1900).

Cosmogony and Religion.— Nowhere did polytheism develop itself into a brighter and more beautiful system than among the ancient Greeks. It was this circumstance no doubt that led the Romans, when they became acquainted with the literature and religion of the Greeks, to adopt their whole religious system and blend it with that of the ancient Italians, identifying the Greek deities with those of their own pantheon. In this way the Greek and Italian deities came to be confounded together, and the names of the latter even came to supersede those of the former, and on this account it will be of service in giving an account of the Greek polytheism to add in brackets to the names of the gods of the Greeks the names of the Italian gods with whom they ultimately became confounded.

According to the view of the origin of all things which in course of time grew up among the Greeks, the universe was in the beginning a formless mass, Chaos (confusion), from which arose the the "broad-bosomed" Earth (Greek, *Gaia, Gē*; Latin, *Tellus*), the Lower World (Tartarus), the darkness of Night (Greek, *Nux;* Latin, *Nox*), the parent of Light, and the formative principle of Love (Greek, *Erōs;* Latin, *Amor*), all of which were regarded as independent divinities. From the womb of the Earth proceeded the Heaven (Greek, *Ouranos*; Latin, *Cœlus*) and the Ocean, and afterward the Titans, creatures of superhuman size and strength, who formed the first dynasty of gods. The Titans were succeeded by a more genial race of divinities endowed with intellectual as well as physical qualities, who subdued the Titans, and subsequently the Giants, another race whom the Earth produced after the loss of her first brood. In this second dynasty of gods

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the supreme ruler was Zeus (Jupiter or Juppiter), the son of Kronos (Saturn), who after the subjugation of the Titans and Giants ruled in Olympus over "the middle air," while his brother Pluto reigned over the dark kingdom of the lower world (Hades, Tartarus, Orcus), and Poseidōn (Neptune), armed with his trident, ruled in the sea. Like reverence was paid to Hera (Juno), the sister and wife of Zeus, and the queen of Heaven, the virgin Pallas Athēnē (Minerva), a goddess armed with helmet and shield, and worshiped as the patroness of all intellectual employments and useful inventions, to the two children of Leto (Latona), Apollo, the leader of the Muses (hence called Musagetes) and the protector of the fine arts, and his sister the chaste huntress Artemis (Diana), the goddess of the moon, to the beautiful daughter of Zeus Aphrodite (Venus), the goddess of love, Ares (Mars), the god of war, Hermes (Mercury), the herald of the gods, and others beside. In addition to these there was an innumerable host of inferior deities (Nymphs, Nereids, Tritons, Horai, Sirens, Dryads and Hamadryads, etc.), who presided over woods and mountains, fields and meadows, rivers and lakes, the seasons, etc. There was also a race of heroes or demigods (Heracles or Hercules, Perseus, etc.) tracing their origin from Zeus, and forming a connecting link between gods and men, while on the other hand the Satyrs formed a connecting link between the race of men and the lower animals. According to a plausible theory, now less generally held than formerly, these gods and demigods are nothing else than the personified objects of nature (the Sky or Upper Air, the Sun, the Ocean, the Air in Motion, etc.), and were originally not conceived as personified, in the strict sense of the term, that is, as clothed in a human form, but simply as the objects themselves, to which the earliest races everywhere attributed a conscious existence like their own, and that the mythological tales relating to these deities and heroes were in their simplest form the natural expression of what human beings in their infancy believed to be done and felt by the very things which they saw. If anything happened to any object they never dreamed of anything else than that object felt what had taken place, and therefore expressed themselves in such a manner as to indicate that belief. If any change took place by the action of one object on another (as when the sun dries up the dew), the former was conceived as consciously acting, and the latter as consciously suffering; the sun in the case supposed was said to kill the dew, and when the original simple belief on which that expression was based was lost, the sun was thought of as a person called Kephalos, and the dew as one called Prokris, and the original phrase came to express a different thing, namely, that Kephalos killed Prokris, that is, that one person killed another. Such is the theory of Max Müller, Mr. Cox, and others.

With regard to the inculcation of religious beliefs, and the practice of religious duties among the Greeks, the most striking thing to remember is that they had no separate class appointed to perform these functions. The priests were in no sense preachers of doctrines, but merely hierophants, or exhibitors of sacred things, of rites, symbols, and images. They showed how the gods were to be worshiped, or more usually how a particular god was to be worshiped; but it was not their office to teach theological doctrine, or even as a rule to exhort to religious duty. The true teachers of the Greek religion were the poets and other writers, and it is to the hymns, epics, dramas, and histories of the Greeks that we must turn in order to learn how they regarded the gods. From this circumstance it results that it is impossible to give a consistent account of the Greek faith, since the different writers are not consistent with each other, each of them, while accepting the common foundations of the popular faith, expressing his own views with regard to the attributes of the gods. Thus we find in some more exalted views than in others, and very frequently also we find that the author is not consistent with himself, expressing in one passage an opinion of his own far above any to which the popular mind had reached, and in another passage expressing, without appearing to see the inconsistency, some one of the popular beliefs in direct contradiction to the former. There thus appears a great amount of vacillation in the representations of the gods found in Greek writers both in respect of what may be called their ontological attributes and their moral attributes. In many places it is stated that the gods live an easy and serene life without physical pain and free from every care. On the other hand the god Prometheus is represented as being doomed to eternal torment by Zeus for an offense he had committed against the other gods. Ares is described in Homer as being wounded in battle and crying out with pain with a shout like that of 10,000 men, and Zeus himself is represented as being pained at the loss of a favorite in battle. The gods are again described in many passages as eternal and immortal; Homer speaks of them frequently as those who were, and are, and are to be. Yet in opposition to this we have seen that another race of gods are supposed to have preceded the dynasty of Zeus and that these passed away, and that Zeus himself and all the other gods were represented as being born, a circumstance which readily suggested that they might also die. The gods are also stated again and again to be

omnipotent; but it is not each of the gods to whom this attribute belongs, but all of them together. The power of each is limited by that of the others; and if omnipotence belongs to any one of them it is to Zeus alone; but even he is represented as subject to Fate. They are also represented as omnipresent and omniscient; but by the first of these attributes it was only meant that in every part of the universe there was a god — not that the universe was pervaded by the power of a single deity — and the second of these attributes is inconsistent with the representations elsewhere occurring of Zeus being in doubt as to what he should do, and even being duped by the artifice of others.

In the case of the moral attributes of the gods, that which is represented with most frequency and uniformity as belonging to them is the attribute of justice, so far at least as that is manifested in the punishment of the wicked. This the Greeks appear to have believed more firmly than anything else, that punishment would most certainly be inflicted by the gods for any offense committed against them. They were not at all disturbed in this belief by seeing men continue to prosper long after the commission of some great crime, for in such a case they said that the gods allowed them to prosper for a while merely in order that the punishment might fall upon them all the heavier in the end. Sometimes a man guilty of some offense would appear to escape punishment altogether, living in prosperity and happiness to the end of his life, but in this case the Greeks had two explanations. Either the punishment due to his crimes descended upon his children, or he was punished in a future state. The first view is frequently expressed in Greek writers, and a striking instance of the firmness with which it is held occurs in Herodotus, who records that when Xerxes, King of Persia, sent to the Spartans to demand of them earth and water in token of submission, the Spartans cast the heralds into a well, telling them to fetch earth and water thence. On this, he says, Talthybius, an ancient herald of Sparta, to whom a temple was erected in the city where he was worshiped as a hero, exhibited signs of anger, and nothing prospered with the Spartans after that, until they determined to send two of their noblest youth to Xerxes, that he might put them to death for the heralds that had been killed at Sparta. Xerxes, however, sent them back unhurt; but the gods, says Herodotus, were not appeased, for the sons of these nobles were afterward captured in battle by the Athenians, who put them to death. The other view, that a person who had escaped punishment in this life would be punished in a future state is also found stated, but not with the same frequency. With regard to the rewards bestowed by the gods on men for their piety, the statements in Greek writers are by no means so clear as those about the punishment of the wicked. It is, indeed, stated that the gods do bestow rewards on men, and generally on the good, but they are nearly as often given to personal favorites. The gods were also represented by the Greeks as holy and truthful, although they are in innumerable other passages described as themselves guilty of the grossest vices, and likewise in prompting men to sin, and deceiving them to their own destruction. In their general attitude toward men the gods appear as inspired by a feeling of envy or jealousy which has to be appeased. They are envious of human prosperity, and desirous to destroy it, and their anger is extended to those who bestow benefits upon them. This comes out in numberless occasions. It was for bestowing the gift of fire upon men that Prometheus was condemned to everlasting torment. In the story of the ring of Polycrates, tyrant of Samos, Amasis, King of Egypt, is related to have advised him, when he was at the height of his prosperity, to cast into the sea whatever he valued most, for if his prosperity continued unbounded the gods would surely bring some great calamity upon him. Again in a story which Herodotus relates of a visit which Solon, the Athenian, paid to Crœsus, King of Lydia, when the latter showed Solon all his wealth, Solon refused to pronounce him the happiest of mankind, for no one could be pronounced happy till he died: "he knew," he said, "how jealous the gods are with regard to human affairs; that they bring many evils on a man in the course of a life of 70 years; and often destroy utterly a man to whom they had granted prosperity." Such then was the general feeling of the gods toward men according to the Greek view, and hence they had constantly to be appeased, and their favor won by sacrifices and offerings. Certain classes were, however, under the peculiar protection and favor of the gods, especially strangers and suppliants. Strangers in Greek States, owing to the fact that they were entirely withdrawn from the protection of the laws, had all the more need of the protection which religion granted them. Hence they came to be considered as the peculiar objects of care of Zeus, who, it was believed, would punish any injury inflicted on them by any one trusting to the impunity allowed him by the laws.

Having thus treated of the views which the Greeks held as to the qualities or attributes of the gods, both ontological and moral, we have now to speak of the religious rites and observances of the Greeks. The Greeks believed that the gods communicated their will to men in various ways, but above all, by means of oracles, the chief of which were that of Apollo at Delphi, that of Zeus

at Dodona, and that of Amphiaraus between Potniæ and Thebes. On account of the general use of oracles other means of divination were not so much resorted to by the Greeks, though they were not entirely neglected. Among these other means was divination by birds, which were supposed to indicate the mind of the gods by the direction of the flight, their manner of feeding, etc. Thunder and lightning was also thought to be a communication from the gods, as well as anything remarkable, such as the birth of a monster, the eruption of a volcano, an earthquake, or a pestilence. If any one sneezed it was likewise thought to be, if rightly interpreted, a communication of the will of the gods. Dreams were, perhaps, in this respect next in importance after oracles. The rites which were performed by the Greeks in order to secure the favor of the gods were sacrifice and prayer. For the performances of all sacrifices of importance the strictest regulations as to time, place, and manner were given, and it was believed that the gods would be offended unless these were rigorously obeyed. Hence we read of the Spartans, who were the most superstitious of the Greeks, breaking up an expedition on one occasion and returning home, because the time for the performance of a certain sacrifice had come round. Sacrifices of less importance were very frequent and were always accompanied by prayers. At births and at deaths, in the morning and in the evening, before every meal and on every special occasion prayers and sacrifices were offered up. At meal times the sacrifice usually consisted of a part of the food that was eaten together with a libation of the wine that was drunk. Offerings were also made to the gods as an atonement for sin, but these were of avail only when the sin had been committed in ignorance, and had always to be accompanied by purificatory rites.

Finally, in connection with the religious beliefs of the Greeks something ought to be stated with regard to their views on a future state. The Greeks appear to have had at all times some belief in a future existence, but in the earliest times this belief was far from being clearly defined. Homer allows a future existence only to the heroes, and even in their case the existence after death is a shadowy existence, in every way inferior to that on earth. When Ulysses visits the lower world and there meets Achilles, the latter is represented as saying to him that he would rather have the existence of a serf on the earth than the life which he lived in the lower world. Between the time of Homer and that of Sophocles and Æschylus a development is discernible in the views held as to a future state, for in both of these poets, though only the heroes are conceived as living after death, their second life is described as altogether happier than their first. The doctrine of the immortality of the soul was first fully taught by the Orphic mysteries. The other mysteries, Samothracian, Dionysian, and Eleusinian, are supposed to have had for one of their objects the imparting to the initiated of more cheerful views regarding a future life than those usually held by the Greeks, but there is no proof that they taught the doctrine in question.

People, Manners, etc.— The principal traits in the character of the ancient Greeks were simplicity and independence of spirit. The Greek was his own instructor, and if he learned anything from others he did it with freedom and without slavish imitation. Nature was his great model, and in his native land she displayed herself in all her charms. The Greek was manly and proud, active and enterprising, violent both in his hate and in his love. These features of the Grecian character had an important influence on the religion, politics, manners, and philosophy of the nation. The gods of Greece were not, like those of Asia, surrounded by a holy obscurity; they were human in their faults and virtues, but were placed far above mortals. They kept up an intercourse with men; good and evil came from their hands; all physical and moral endowments were their gift. The love of freedom among the Greeks sprang partly from their good fortune in having lived so long their own masters, partly from their natural high spiritedness. It was this which made small armies invincible, and enabled them to repel overwhelming odds. The cultivation of their fruitful country, which by the industry of the inhabitants afforded nourishment to several millions, and the wealth of their colonies, prove the activity of the Greeks. Commerce, navigation, and manufactures flourished on all sides; knowledge of every sort was accumulated; the spirit of invention was busily at work; the Greeks learned to estimate the pleasures of society, but they also learned to love luxury. From these sources of activity sprang also a love of great actions and great enterprises, so many instances of which were furnished by Grecian history. Another striking trait of the Grecian character was a love of the beautiful, both physical and intellectual. This sense of the beautiful, awakened and developed by nature, created for itself an ideal of beauty, which served them, and has been transmitted to us, as a criterion for every work of art. A noble simplicity pervades everything which comes from them. It is this which has made the Greeks the instructors of all ages and nations.

Greek Language and Writing.— The language which we call Greek belongs, as is well known, to the Indo-European or Aryan family of tongues, being akin to the Sanskrit, Persian, Latin, Celtic, Slavonic, and

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Germanic languages, including of course English. Out of Greece it was spoken in a great part of Asia Minor, in the S. of Italy and Sicily, and in other regions which were settled by Grecian colonies. From the great number of Hellenic tribes of the same race it was to be expected that there would be different dialects, the knowledge of which is the more necessary for becoming acquainted with the Greek language, since the writers of this nation have transmitted the peculiarities of the different dialects in the use of single letters, words, forms, terminations, and expressions, and that not merely to characterize more particularly an individual represented as speaking, but even when they speak in their own person. It is customary to distinguish three leading dialects, according to the three leading branches of the Greeks, the Æolic, the Doric, and the Ionic, to which was afterward added the mixed Attic dialect; beside these there are several secondary dialects. Akin to the Ionic is the so-called Epic dialect, that in which the poems of Homer and Hesiod are written, and which was afterward adopted by other epic writers. The Doric was hard and harsh; the Ionic was the softest. The Æolic was spoken on the N. Isthmus of Corinth (except in Megara, Attica, and Doris), in the Æolian colonies of Asia Minor, and on some of the N. islands of the Ægean Sea. The Doric was spoken in the Peloponnesus, in the Doric Tetrapolis, in the Doric colonies of Asia Minor, of Lower Italy (Tarentum), of Sicily (Syracuse, Agrigentum), and most purely by the Messenians; the Ionic in the Ionian colonies of Asia Minor, and on the islands of the Archipelago; and the Attic in Attica. In each of these dialects there are celebrated authors. The Ionic dialect is found pure in some prose writers, especially Herodotus and Hippocrates. The Doric is used in the poems of Pindar, Theocritus, Bion, and Moschus. Little Doric prose remains, and that is mostly on mathematical or philosophical subjects. In Æolic we have fragments of Alcæus and Sappho. After Athens had obtained the supremacy of Greece, and rendered itself the center of all literary cultivation, the masterpieces of Æschylus, Sophocles, Euripides, Aristophanes, Thucydides, Xenophon, Plato, Aristotle, Isocrates, Demosthenes, etc., made the Attic the common dialect of literature. Grammarians afterward distinguished the genuine Attic, as it exists in those masters, from the Attic of common life, calling the latter the common Greek, or Hellenic dialect; and even the later Attic writers, posterior to the golden age of the literature, were designated Hellenes or common Greeks. In this latter class are Theophrastus, Apollodorus, Polybius, Plutarch, and others. Many of the later writers, however, wrote genuine Attic, as Lucian, Ælian, and Arrian. Except the dramatists, the poets by no means confined themselves to the Attic; the dramatists themselves assumed the Doric, to a certain degree, in their choruses, for the sake of giving them additional solemnity, because of the antique and venerable character of this dialect. Undoubtedly the Greek dialects were not, in the earliest times, so distinct from each other as they afterward became; and on this subject we may quote the words of Prof. Bury: "There can be little doubt that the mixture of the Greeks with the native peoples had a decisive effect on the differentiation of the Greek dialects. The dialects spoken by the first settlers in Thessaly, in Attica, in Arcadia, have some common characteristics which tempt us to mark them as a group, and distinguish them from another set of dialects spoken by Greek folks which were to appear somewhat later on the stage of history. We may conjecture that the first set of invaders spoke in their old home much the same idiom; that this was differently modified in Thessaly and Bœotia, in Attica and Argolis, and the various countries where they settled; and that many of the local peculiarities were developed in the mouths of the conquered learning the tongue of the conquerors." It results that to have a thorough knowledge of the Greek language we must follow out historically as far as possible the course of its formation, extending our view over all the varied forms of the dialects — a labor which this language, so rich in classic models of every kind, so perfect, so flexible, so expressive, so sweet in its sound, so harmonious in its movements, and so philosophical in its grammatical forms and whole structure, merits, and richly rewards.

When the Greeks became acquainted with the art of writing we do not know. In Egypt hieroglyphics were used more than 3,000 years before the Christian era, and the cuneiform writing of Assyria and Babylonia had a similar antiquity. In Crete writing was practised more than 2,000 years before Christ, it is believed, and among the Asiatic Greeks it was probably introduced 9 or 10 centuries before Christ. According to the writer above quoted: "Perhaps the earliest example of a Greek writing that we possess is on an Attic jar of the 7th century; it says the jar shall be the prize of the dancer who dances more gaily than all the others. But the lack of early inscriptions is what we should expect. The new art was used for ordinary and literary purposes long before it was employed for official records. It was the great gift, which the Semites, who themselves derived it from Egypt, gave to Europe." According to the legend it was Cadmus the Phœnician who introduced the alphabet into Greece; and, as already mentioned, it is an undoubted fact that the most of the Greek letters are derived from the Phœnician ones. The

Greek alphabet possesses the following 24 letters: A, α (alpha), *a*; B, β (beta), *b*; Γ, γ (gamma), *g*; Δ, δ (delta), *d*; E, ε (epsilon), *ĕ*; Z, ζ (zeta), *z*; H, η (eta), *ē*; Θ, θ (theta), *th*; I, ι (iota), *i*; K, κ (kappa), *k*; Λ, λ (lambda), *l*; M, μ (mu), *m*; N, ν (nu), *n*; Ξ, ξ (xi), *x*; O, ο (omicron, *i. e.*, small o), *ŏ*; Π, π (pi), *p*; P, ρ (rho), *r*; Σ, σ, *s* (sigma), *s*; T, τ (tau), *t*; Υ, υ (upsilon), *u*, commonly transliterated by *y*; Φ, φ (phi), *ph*; X, χ (chi), *ch* guttural (as in Scotch *loch*); Ψ, ψ (psi), *ps*; Ω, ω (omega, or great *o*), *ō*. There are also marks indicating accent, a rough and smooth breathing, the former equivalent to h initial before a vowel; but no j, v, w, etc. The alphabet originally introduced into Greece is said to have consisted of but 16 letters; four (Θ Ξ Φ X) are said to have been invented by Palamedes during the Trojan war, and four more (Z H Ψ Ω) by Simonides of Ceos. That the eight letters mentioned are more modern than the others is certain, partly from historical accounts, partly from the most ancient inscriptions. It remains to remark that the Greeks originally wrote from right to left, then *boustrophedon*, that is, alternately from right to left and left to right, and finally always from left to right.

Greek Literature.—The origin of Greek literature, that is, of the intellectual cultivation of the Greeks as contained in written works, is lost in an almost impenetrable obscurity. Though there existed in Greece, in earlier times, no actual literature, there probably was by no means a want of what we may not improperly call literary cultivation, if we free ourselves from the prejudice that a literature must of necessity be embodied in written alphabetical characters. The first period of Grecian cultivation, which extends to the movement known as the invasion of the Peloponnesus by the Heraclidæ and Dorians, and the great changes produced by it, and which we may designate by the name of the ante-Homeric period, was no doubt utterly destitute of literature; but it may be questioned whether it was also destitute of all that culture which we are accustomed to call literary. The fables which are told of the intellectual achievements of this period may have a certain basis of truth. Among the promoters of literary cultivation in this time we must distinguish three classes: (1) Those of whom we have no writings, but who are mentioned as inventors of arts, poets, and sages; Amphion, Demodocus, Melampus, Olen, Phemius, and Prometheus. (2) Those to whom are falsely attributed works no longer extant: Abaris, Aristeas, Chiron, Epimenides, Eumolpus, Corinnus, Linus, and Palamedes. (3) Those to whom writings yet extant, which, however, were productions of later times, are attributed: Dares, Dictys, Horapollo, Mesæus, Orpheus, and the authors of the Sibylline oracles. This is not the place to inquire whether any and how much of these writings is genuine. It is enough that the idea of such a forgery proves a belief in the existence of the earlier productions. And how could the next period have been what it was without previous preparation? If we may thus infer what must have been in order that the succeeding period should be what it was, we learn also from the various traditions of the ante-Homeric period that there existed in it institutions which, through the names of religion, poetry, oracles, and mysteries, had no small influence on the civilization of the nation and the promotion of culture; for the most part, indeed, in Oriental forms, and perhaps of Oriental origin; and that these institutions, generally of a priestly character, obtained principally in the N. parts of Greece, Thrace, and Macedonia. We must here remark that intellectual cultivation did not prosper at once in Greece, nor display itself simultaneously among all the tribes; that the Greeks became Greeks only in the process of time, and some tribes made more rapid progress than others.

About 80 years after the Trojan war new commotions and a new migration began within the borders of Greece. A portion of the inhabitants emigrated from the mother country to the islands and to Asia Minor. This change was in the highest decree favorable to Grecian genius; for the new settlements, abounding in harbors, and destined by nature for commerce and industry, afforded them not only a more tranquil life, but also a wider field for refinement, and gave rise to new modes of life. The ancients ascribed to the colonies in Ionia and the rest of Asia Minor the character of luxury and voluptuousness. The blue sea, the pure sky, the balmy air, the beautiful prospects, the finest fruits and most delicious vegetables in abundance, all the requisites of luxury, here united to nourish a soft sensuality. Poetry and philosophy, painting and statuary, here attained their highest perfection; but great and heroic deeds were oftener celebrated than performed. Near the scene of the first grand national enterprise of the Greeks — the Trojan war — it was not strange that the interest this event excited should be lively, and that it should take a powerful hold of the imagination. Poetry thus found a subject in the treatment of which it necessarily assumed a character entirely distinct from that of the former period. Among all nations heroic poetry has flourished with the spirit of heroism. The heroes were here followed by the bards, and thus the epopee was formed. We therefore call this second period the epic age of the Greeks. The minstrel (*aoidos*) now appears separated from the

priest, but highly honored, particularly because the memory of the heroes lived in his verse; and poetry was the guardian of all the knowledge of preceding times, so long as traditions were not committed to writing. From its very nature the epopee must be historical in an enlarged sense.

Under such circumstances it is not strange that regular schools for poets were established; for the imagination of the first poet fired the imagination of others and it was then perhaps believed that poetry must be learned like other arts — a belief to which the schools for priests, on which the schools for minstrels were probably modeled, contributed not a little. But they were minstrels in the strictest sense, for their traditions were sung, and the poet accompanied his verses on a stringed instrument. On every important occasion minstrels were present, who were regarded as standing under the immediate influence of the gods, especially of the Muses, who were acquainted with the present, the past, and the future. The minstrel, with the seer, thus stood at the head of men. But among the many minstrels which this age undoubtedly possessed, Homer alone has survived, whose name has always been associated with the two great epic poems, the "Iliad" and "Odyssey," though in modern times the theory first promulgated by Wolf in 1795, that neither of these poems is the work of one man, has been accepted either entirely or with modifications by many scholars, and many others who contend for the unity of each of the two poems are yet inclined to believe that they were not both composed by the same individual. The latter opinion is not of modern origin, but divided also the Homeric scholars of ancient times. Several hymns and a mock heroic poem called the "Batrachomyomachia," or the "Battle of the Frogs and Mice," are also ascribed to Homer, but on altogether insufficient grounds.

From him an Ionian school of minstrels takes its name — the Homeridæ — who probably constituted at first, at Chios, a distinct family of rhapsodists, and who preserved the old Homeric and epic style, the spirit and tone of the Homeric verse. Much that was attributed to Homer may reasonably be assigned to them. A certain class of the followers of Homer are known by the name of the Cyclic poets, who began, however, to deviate materially from the Ionian epos, the historical element predominating more and more over the poetical. By Cyclus we understand the whole circle of traditions and fables, and not merely the events of the Trojan war. Cyclic poetry comprehended the whole compass of mythology; and we may, therefore, divide it into (1) a cosmogonical, (2) a genealogical, and (3) a heroic Cyclus; in the latter of which there are two separate periods:

(1) that of the heroes before, and (2) that of those after, the expedition of the Argonauts. To the first class belong the battles of the Titans and giants; to the second, the theogonies and herogonies. To the first period of the third class belong the Europia, several Heracleia and Dionysiacs, several Thebaids, Argonautics, Theseids, Danaids, Amazonica, etc. In the second period the poetry generally related to the Trojan war. To this belonged the Nostoi, which treated of the return of the heroes from Troy. The earliest of these Cyclic poets appeared about the time of the first Olympiad. A history of the gradual formation of their poetry cannot be given, because we have only very general accounts respecting them. But what we do know justifies us in concluding that between these historic poets and the Ionian school of minstrelsy something intervened, making, as it were, the transition. And we actually find this in the Bœotian-Ascrean school, which arose in European Greece, it is said, in the 8th century B. C. It derived its name from Ascra in Bœotia, the residence of Hesiod, who stood at its head, and by whom poetry was probably conducted back again from Asia Minor (for he was originally of Cyme in Æolia) to Greece. His works also were at first preserved by rhapsodists. They were not arranged till a later period, when they were augmented by foreign additions; so that, in their present form, their authenticity is as doubtful as that of the poems ascribed to Homer. Of the 16 works attributed to him there have come down to us the "Theogony," the "Shield of Hercules" (the fragment of a larger poem), and "Works and Days" (a didactic work on agriculture), the "Choice of Days," intermixed with moral and prudential maxims, etc. The works of Homer and Hesiod acquired a canonical importance among the Greeks, and constituted in a certain degree the foundation of youthful education.

In the third period, the age of lyric poetry, of apologues and philosophy, our knowledge of Greek history gradually acquires a greater certainty. About the beginning of the epoch of the Olympiads (776 B. C.) there ensued a true ebb and flood of constitutions among the small States of Greece. After numerous vicissitudes of power, during which the contending parties persecuted each other for a long time with mutual hatred, republics, with democratical constitutions, finally sprang up, which were in some measure united into one whole by national meetings at the sacred games. The spirit prevalent in such a time greatly favored lyric poetry, which now became an art in Greece, and reached the summit of its perfection at the time of the invasion of the Persians. Next to the gods, who were celebrated at their festivals with hymns, their country, with its heroes, was the lead-

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ing subject of this branch of poetry, on the character of which external circumstances seem to have exercised no slight influence. The mental energies of the nation were roused by the circumstances of the country; and the numerous wars and conflicts, patriotism, the love of freedom and the hatred of enemies and tyrants, gave birth to the heroic ode. Life, however, was at the same time viewed more on its dark side. Thence there was an intermingling of more sensibility in the elegy, as well as on the other side a vigorous reaction in which the spirit of ridicule gave rise to the iambus (satire). In everything there was a more powerful impulse toward meditation, investigation, and labor for the attainment of a desired condition. The golden age, the gift of the gods, was felt to have departed. Whatever man discovered in future was to be the fruit of his own efforts. This feeling showed that the age of manhood had arrived. Philosophy had become necessary, and attained continually a greater development. It first spoke in maxims and gnomes, in fables and in dogmatic precepts. Lyric poetry next gave utterance to the feelings excited by the pleasures of earth. Of those who gained a reputation in this way, as well as by the improvement of music and the invention of various forms of lyric poetry, history presents us the names of Archilochus of Paros, inventor of the iambus; Tyrtæus, author of war songs; Callinus of Ephesus, inventor of the elegiac measures (all of whom flourished about 700 B. C.); Terpander of Antissa, in Lesbos (675 B. C.); Simonides of Amorgos (664), the second of the three principal iambic poets of Greece; Alcman the Lydian, and Arion of Methymna, said by Herodotus to have invented the dithyrambus (both flourished about 630 B. C.); Sappho, Alcæus, and Erinna, all natives of Lesbos, the first two of Mitylene, and all of whom flourished about 610 B. C.; Mimnermus of Colophon (flourished from about 634 to 600 B. C.); Stesichorus of Himera (600); Ibycus of Rhegium (lived about 540 B. C. at the court of Polycrates of Samos); Anacreon of Teos (lived first at the court of Polycrates, afterward at that of Hipparchus at Athens); Hipponax of Ephesus (540 to 520), the third great iambic poet; Lasus of Hermione (520); Simonides of Ceos (500); his contemporary, Timocreon of Rhodes; Corinna of Tanagra (490), the friend and instructress of Pindar (522–442). As gnomic writers, Theognis of Megara and Phocylides of Miletus deserve to be named (both of whom flourished about 540 B. C.); as a fabulist, Æsop (570 B. C.). In the order of time several belong to the following period, but are properly placed here on account of their connection.

If we consider the philosophy of this age, we find it to have generally had a practical character. The philosophy of life must precede the philosophy of science. Philosophy must give lessons of wisdom before it can furnish scientific systems. In this light must we consider the "seven wise men of Greece," as they are called (whose names as usually given are Periander, Pittacus, Thales, Solon, Bias, Chilo, and Cleobulus); who acquired the name of wise from their mature experience and the practical wisdom resulting from it, their prudence and reflection, their skill in affairs of State, in business and the arts. They all flourished in the 7th and 6th centuries B. C. Their sayings are practical rules, originating in the commerce of life, and frequently only the expression of present feelings. But as knowledge is the foundation of science, further investigations resulted in theoretical philosophy. Thales was the founder of the Ionic philosophy. Here we stand on the most important point of the history of the literary development of Greece, where poetry ceases to contain everything worthy of knowledge, to be the only source of instruction. Hitherto she had discharged the office of history, philosophy, and religion. Whatever was to be transmitted to posterity, whatever practical wisdom and knowledge was to be imparted, whatever religious feelings were to be inspired, recourse was had to her measured strains, which, from their rhythmical character, left a deeper and stronger impression on the memory. Henceforth it was to be otherwise. Civil life was to have an important influence on language. The public transactions, in which the citizen took a part, compelled him to make the language of common life more suitable for public delivery. This and alphabetical writing, that had now become common in Greece with the introduction of the Egyptian papyrus, prepared the way for the formation of prose. All this had an essential influence on the condition of science. From epic poetry proceeded by degrees history. From the practical wisdom conveyed in verse proceeded an investigating philosophy. Our former singleness of view is thus lost. We must now necessarily turn our attention to different sides, and in the rest of our sketch follow out each branch separately. Everything tended to excite the spirit of inquiry, and a scientific activity was everywhere awakened. We may therefore call the fourth period that now ensued the scientific period. It reaches to the end of Greek literature, but is divided into several epochs, according to the different spirit which predominated, and the superiority which a particular branch acquired at different times.

The fourth period extends from Solon to Alexander (594–336 B. C.). In philosophy a physico-speculative spirit was manifested; for philosophy originated immediately from

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religion, and all religion rests on the conception of the Divinity which was not then distinguished from nature. Now, since the conception of religion contained nothing but poetical ideas of the origin of the principal phenomena of nature, that is, of the divinities, the most ancient philosophy was of necessity natural philosophy in which the human mind sought to analyze more thoroughly the phenomena previously observed, to explain them more satisfactorily, and to comprehend them in one whole. From the want of sufficient experimental acquaintance with nature it was to be expected that the imagination would frequently interfere in the work of the understanding and reason. From this cause these philosophical inquiries are interwoven with poetical images. This was the form of the Ionic philosophy, whose author was Thales (about 636–546); of the Pythagorean or Italic, whose founder was Pythagoras (540–510), and the older and later Eleatic. To the Ionic school, which sought after a material origin to the world, belonged Pherecydes (544), Anaximander (610–547), Anaximenes (544–480), Anaxagoras (500–428), Diogenes of Apollonia and Archelaus (450). The principal disciples of the Pythagorean philosophy, the leading idea of which was that of harmony or proportion, were, in Italy, Philolaus (440), Timæus of Locri, Ocellus Lucanus, and Archytas (400). To the older Eleatic school, which held the idea of a pure existence, belonged Xenophanes (540–500), Parmenides (480); to the later, Zeno (460) and Melissus. The atomists, Leucippus (of uncertain date), Democritus of Abdera (460), and Diagoras (410), as well as Empedocles (444), the author of the idea of four eternal and unchangeable elements (fire, air, earth, and water), acted on by two eternal and opposite forces (love and hate), are connected with this school. On the other hand, Heraclitus (513) stands alone in his theory of the eternal flow of things.

Till near the end of the 5th century B. C. the philosophers and their scholars were dispersed through all the Greek cities. About this time Athens became their principal place of residence, which contributed not a little to breathe another spirit into philosophy, the Sophists becoming the teachers. Gorgias of Leontini in Sicily, who joined the Eleatics, Protagoras of Abdera, Hippias of Elis, and Prodicus of Ceos, are the most celebrated whose names have reached us. Their name designates them as men of science; and they were in fact the encyclopædists of their times, who collected the ideas and sentiments of the former ages, and enriched them with their own. They were particularly distinguished in rhetoric and politics, two sciences so highly important in democratic forms of government; but not contented with this they also professed the natural sciences, mathematics, the theory of the fine arts, and philosophy. In the last it does not seem to have been their object to arrive at truth, but only to make a plausible argument; and for this end they necessarily made use of those specious dialectic devices still called from them sophistries, and sought to lead their opponents astray by various means. That this must needs be detrimental to true philosophy is evident. So much the more fortunate was it that in this very age Socrates (469–399) appeared, who was not only a strenuous antagonist of these Sophists, but opened a new career to philosophy itself. It has been justly said of him that he brought down philosophy from heaven to earth, for he gave it again a practical direction, differing, however, from the former, since the object was no longer merely to string together experiments, but philosophers began to investigate the nature and relations of man, the object and best regulation of life; and reflection was turned principally to psychology and morals, instead of physics and metaphysics. Socrates had many scholars, some of whom committed his ideas to writing in his manner — Cebes, Æschines, Xenophon; others, deviating more or less from his ideas and his manner, were founders of philosophical schools of their own. The four following schools proceeded from that of Socrates: (1) The Cyrenaic, whose founder was Aristippus of Cyrene (370); (2) the Megaric, under Euclid (399); (3) the Academic, whose founder was Plato (429–347); and (4) the Cynic, whose founder was Antisthenes. Plato was unquestionably the most comprehensive and splendid genius. With the philosophical knowledge of the former Greek philosophers he combined that of the Egyptian priests and the eloquence of the Sophists. A fondness for the supernatural, a delicate moral sense, a fine, acute, and profound understanding, reign in his productions, which are adorned with all the graces of expression and are enlivened by a rich imagination. By his poetic talent the philosophical dialogue of Socrates was presented under a truly dramatic form.

While philosophy was making such important progress, history rapidly approached perfection. In the period of 550–500 B. C. traditions were first committed to writing in prose, and Cadmus of Miletus (540), Acusilaus the Argive, Hecatæus of Miletus (500), Hellanicus of Mitylene, and Pherecydes of Scyros, are among the oldest historical writers (450). These are known as the logographers (*logographoi*), a name given to them by Thucydides. After them appeared Herodotus (born 484), the Homer of history. His example kindled Thucydides (born 471) to emulation, and his eight books of the history of the Peloponnesian

war make him the first philosophical historian, and a model for all his successors. If his conciseness sometimes renders Thucydides obscure, in Xenophon (born about 444), on the contrary, there prevails the greatest perspicuity; and he became the model of quiet, unostentatious historical writing. These three historians are the most distinguished of this period, in which we must, moreover, mention Ctesias (400), Philistus (363), and Theopompus (340).

An entirely new species of poetry was created in this period. From the thanksgiving festivals which the country people solemnized after the vintage in honor of Dionysus (Bacchus), with wild songs and comic dances, arose, especially in Attica, the drama. By degrees variety and a degree of art were given to the songs of the village chorus, and by and by an intermediate speaker was introduced, who related popular fables, while the chorus varied the eternal praises of Bacchus by moral reflections, as the narrative prompted. These games of the feast of the vintage were soon repeated on other days. Solon's contemporary, Thespis, who smeared his actors, like vintagers, with lees of wine, exhibited at the cross ways or in the villages, on movable stages, stories sometimes serious with solemn choruses, sometimes laughable with dances, in which satires and other ridiculous characters excited laughter. Their representations were called tragedies (*tragodiai*), that is, songs of the goat (so called either because the exhibition of a tragedy was in the earliest times accompanied by the sacrifice of a goat, or because a goat was the prize, or because the actors were clad in goat-skins); comedies (*komodiai*, meaning either village songs, from *kome*, a village, or songs of revelry, from *komoe*, revelry), festive dances, and satirical actions (*drama satyricum*). These sports were finally exhibited with much more splendor on the stages of the towns, and acquired a more and more distinct character by their peculiar tone and morality. Instead of an intermediate speaker, who related his story extemporaneously, Æschylus (525–456) first substituted actors, who repeated their parts by rote; and he was thus the actual creator of the dramatic art, which was soon carried to perfection; tragedy by Æschylus, Sophocles (495–406), and Euripides (480–406); comedy by Cratinus (519–422), Eupolis (449), Crates, but especially by Aristophanes (about 444–380). Under the government of the "Thirty Tyrants" the freedom which comedy had possessed of holding up living characters to ridicule, was restricted, and the middle comedy was thus gradually formed in which the chorus was abolished, and with delineations of general character, characteristic masks were also introduced. The mimes of Sophron of Syracuse (460–420), dramatic dialogues in rhythmical prose, formed a distinct species, in connection with which stands the Sicilian comedy of Epicharmus (about 540–450).

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Eloquence, the necessary outcome of the democratic institutions of many of the Greek States, likewise flourished during this period, and was speedily elevated to the rank of a fine art. Antiphon (440), Lysias (458–378), Isocrates (436–338), Isæus (420–348), Demosthenes (about 385–322), Æschines (389–314), were renowned masters of this art. We still possess the admired masterpieces of several of these orators. How near rhetoric was then to triumphing over poetry is manifested in Euripides, and there is no question that it had a considerable influence on Plato and Thucydides. Mathematics was now cultivated, and geography served to illustrate history. Astronomy is indebted to the Ionic school, arithmetic to the Italic, and geometry to the Academic school for many discoveries. As mathematicians, Meton, Euctemon, Archytas of Tarentum, Eudoxus of Cnidus were celebrated. Geography was particularly enriched by voyages of discovery which were occasioned by commerce; and in this view Hanno's voyage to the W. coast of Africa, the "Periplus" of Scylax (a description of the coasts of the Mediterranean), and the discoveries of Pytheas of Massalia in the N. W. of Europe, deserve mention. The study of nature was likewise pursued by the philosophers; but the healing art, hitherto practised by the Asclepiadæ in the temples, constituted a distinct science and Hippocrates (about 460–357) became the creator of scientific medicine.

The following period is usually called the Alexandrine, and might be characterized as the systematizing or critical period. Athens did not, indeed, cease to sustain its ancient reputation; but during the greater part of the period Alexandria was in reality the leading Greek city. From this and other causes the spirit of Grecian literature necessarily took another turn. Greece was now under a foreign yoke; great creative geniuses no longer arose either in the home country or in the colonies; and the use of an immense library tended to make erudition triumph over the free action of mind, which, however, could not be immediately overborne. In philosophy, Plato's acute and learned disciple Aristotle (384–322) appeared as the founder of the Peripatetic school, which gained distinction by enlarging the territory of philosophy, and by its spirit of system. He separated logic and rhetoric, ethics and politics, physics and metaphysics, and applied philosophy to several branches of knowledge; thereby producing economics, pedagogics, and poetics. He invented the philosophical syllogism and gave philosophy the form which it preserved for centuries. His disciple

Theophrastus (died 287 B. C.) followed his steps in the investigation of philosophy and natural history. But the more dogmatic was the philosophy of Aristotle, the more caution was requisite to the philosophical inquirer, and the spirit of doubt was salutary. This was particularly exhibited in the systems of skepticism which originated with Pyrrho of Elis (330). A similar spirit subsisted in the middle and new academics, of which Arcesilaus (241) and Carneades (155) were the founders. The Stoic school, founded by Zeno of Citium in Cyprus (342–270), and the Epicurean, of which Epicurus (299–279) was the founder, were chiefly remarkable for the effect that they had in the development of moral speculation in opposite directions, which gradually brought about a great difference in the practice of the adherents of the opposite schools. Mathematics and astronomy made great progress in the schools at Alexandria, Rhodes, and Pergamus. And to whom are the names of Euclid (323–283), Archimedes (287–212), Eratosthenes (276–196), and Hipparchus (160–145) unknown?

The expeditions and achievements of Alexander furnished abundant matter to history; but on the whole it gained in extent, not in value, since a preference for the wonderful over the actual had now become prevalent. The more gratifying therefore is the appearance of Polybius of Megalopolis (204–122), who is to be regarded as the author of the true method of historical exposition by which universal history acquired a philosophical spirit and a worthy object. Geography, which Eratosthenes made a science, and Hipparchus united more closely with mathematics, was enriched in various ways. To the knowledge of countries and nations much was added by the accounts of Nearchus, Agatharchides, and others. With respect to poetry many remarkable changes occurred. In Athens the middle comedy gave place, not without the intervention of political causes, to the new, which approaches to the modern "comedy of manners." Among the many poets of this class Menander (342–291) and Philemon (330) were eminent. To this period also belong the celebrated idyllic poets Theocritus (270), and his contemporary Bion, as well as Moschus, who lived about 20 years later. The other kinds of poetry did not remain uncultivated; we may mention the learned poetry of Callimachus and of Lycophron, the epic of Apollonius Rhodius, the didactic of Aratus and Nicander; but all these labors, as well as the criticisms of poetry and the fine arts, point to Alexandria; and we shall therefore pass them over in this place. The Septuagint or Greek translation of the Old Testament was a work of scholars of the Alexandrian school. The period subsequent to 146 B. C. is known as the Græco-Roman. Polybius may be placed here as well as the other historians, Diodorus Siculus and Dionysius of Halicarnassus; while in the Christian era we have Josephus, Arrian, Appian, Herodian; the biographies of Plutarch, Diogenes Laertius, and Philostratus; the geographies of Strabo and Pausanias; the astronomy and geography of Ptolemy; the informatory works of Athenæus, Ælian, and Stobæus; the medical works of Galen; the satirical works of Lucian; and the Greek romances best represented in Heliodorus, Achilles Tatius, and Chariton.

***Greece, Modern** (Greek, Hellas), a kingdom in the S. E. of Europe, corresponding, since the incorporation of Thessaly, very nearly to ancient Greece in the narrower sense; bounded on the N. by Turkey, and on all other sides by the sea — the Ionian Sea on the W., the Mediterranean proper on the S., and the Ægean Sea on the E. The mainland forms two chief portions, united by the narrow Isthmus of Corinth; a N., called Northern Greece or Livadia, and a S. peninsula, called the Peloponnesus or Morea. By far the largest island is Eubœa, only separated from the mainland of Livadia by the narrow channel of Euripo. The other islands form several groups: The Northern Sporades on the N. E. of Eubœa, including Skiatho, Skopelo, Kilidromia, Pelago, Peristeri or Sakarino, and Skyro; the Western Sporades, chiefly in the Gulf of Egina, or between it and the Gulf of Nauplia, including Hydra, Spezzia, Poros, Egina, and Koluri or Salamis; the Cyclades, and the Ionian Islands. (See GREECE, ANCIENT). The capital is Athens.

Divisions.— Greece is politically divided into 16 nomarchies, which are again subdivided into eparchies, and these again into demes. The following table gives the names of the nomarchies, with the area of each of them, and the population according to the returns for 1896:

	Nomarchies.	Area in sq. m.	Pop. 1896.
Northern Greece:	Attica and Bœotia.	2,472	313,069
	Phocis and Phithiotis	2,044	147,297
	Acarnania and Ætolis	3,013	170.565
Peloponnesus:	Argolis and Corinth	1,442	157,578
	Achaia and Elis..	1,901	236,251
	Arcadia	2,020	167,092
	Messenia	1,221	205,798
	Laconia	1,679	135,462
Islands:	Eubœa and Sporades	2,216	115,515
	Cyclades	923	134,747
	Corfu	431	124,578
	Zante	277	45,032
	Cephalonia	302	83,363
Thessaly:	Arta	395	39,144
	Trikkala	2,200	176,773
	Larissa	2,478	181,542
	Total	25,014	2.433,806

In 1899 Greece was divided into 26 nomarchies, and these into 69 districts and 442 communes. Pop. (1905) est. 2,680,403.

Climate.— The climate is generally mild, in the parts exposed to the sea equable

*For Map, see TURKEY.

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and genial, but in the mountainous regions of the interior sometimes very cold. None of the mountains attain the limit of perpetual snow; but several of them are so lofty as to retain a covering of it after the summer has far advanced. In general the first snow falls in October and the last in April. During the summer rain scarcely ever falls, and the channels of almost all the minor streams become dry. The air is then remarkably clear, and a month will sometimes pass away without a cloud being seen. A sudden change, however, takes place toward the end of harvest. Rain becomes frequent and copious; and the streams which had been dried up not only fill their channels, but frequently overflow them, and lay considerable tracts under water. In this way stagnant pools and marshes are occasionally formed, which give rise to intermittent fevers. Compare GREECE, ANCIENT.—*Climate.*

Vegetation, Agriculture, etc.— The cultivated land in Greece has recently been estimated at rather more than 3,500,000 acres, but of the land under cultivation about one-third is always fallow, according to the backward system of agriculture still pursued in Greece, where the plow commonly in use differs in no respect from that which Hesiod described 3,000 years ago. Many plows of modern type are now being introduced, however, as well as other modern implements. The land is greatly subdivided, peasant proprietors being very numerous, and farming on a large scale is almost unknown. The improvement that has taken place of late years is nevertheless stated to be considerable. The produce of the arable land has greatly increased and much additional land has been brought under cultivation. Thessaly is the richest portion of Greece agriculturally. The condition of the agricultural population is said to be very satisfactory. The principal cereal crops are wheat, barley, and maize, but the quantity raised is not sufficient, and much grain is imported. All the fruits of the latitude are grown — figs, almonds, oranges, citrons, melons, etc.— in abundance and of excellent quality, without receiving any great share of attention. The vine also grows vigorously and considerable quantities of wine are made, some of the sorts being of high quality. But a much more important product of Greece, especially on the coasts of the Peloponnesus, and in the islands of Cephalonia, Zante, Ithaca, and Santa Maura, is the Corinthian grape or currant, the export of which has increased in value from £729,720 in 1866 to £1,511,670 in 1898. Another important object of cultivation is the olive, for which both the soil and the climate are alike favorable. The culture of the mulberry for the rearing of silk worms is carried on to some extent. Some good tobacco is grown. The forests contain, among other trees, the oak (*Quercus Ægilops*) which yields the valonia of commerce. The live stock are neither numerous nor of good breeds. The raising of artificial grasses for their maintenance may be said to be unknown, and the scanty herbage which natural pasture affords must be of little avail. Asses and mules are more numerous than horses; cattle are comparatively few; and the chief animals from which dairy produce is obtained are the sheep and the goat. The quantity of wool produced is considerable, but most of it is of a coarse description.

Manufactures, Trade, Communications, etc.— The manufactures are limited, but with all other branches of industry in Greece are increasing, and are furthered by high duties on imported goods. The employment of the steam engine in manufacturing industries dates from about 1868, and is yet only developed to a small extent. Piræus is the chief industrial center, having spinning and weaving factories for cotton, silk, and wool, machine shops, paper works, dye works, etc. Other centers are Syra, Corinth, Nauplia, Patras, Larissa. Still, cottons and other textiles form by far the most important part of the imports of manufactured goods. Leather manufactures form an important branch of industry. Marble has been worked from the most ancient period in the quarries of the island of Paros. In 1871 the working of the ancient argentiferous lead mines of Laurion in Attica was resumed with good success; and quantities of manganese iron ore and zinc ore are also mined in this district. The most important branch of manufacturing industry is shipbuilding, which is carried on at various places. Much of the trade carried on is merely coasting, but the foreign trade also is of considerable extent. A large part of the foreign shipping of Greece is that which deals with the import of the manufactures of England, Germany, etc., into Greece, Turkey, and the Levant generally. In regard to this branch, the peculiar advantages which the Greeks possess in their knowledge of the languages and acquaintance with the habits and wants of the people of these countries have been greatly in their favor. The chief ports of Greece are Piræus (the port of Athens), Syra, and Patras. The principal export is currants, but wine, olive oil, dried figs, raisins, silver, lead, zinc ore, and manganese iron ore, tobacco, sponges, and other articles are also exported; the principal imports are cereals, coals, and cotton and woolen goods. The imports in 1898 were £6,083,400, and the exports £3,577,530. The greatest hindrance to the development of Greece is the want of good roads which are peculiarly necessary in so mountainous a country. Attention, however, has been directed to the supplying of this want, and

there are now over 2,000 miles of roads. Among other public works which have engaged the energies of the Greeks are the construction and restoration of harbors, the erection of lighthouses, the execution of drainage works, etc. In 1883 there were only 58 miles of railways open, but in 1898 591 miles were open, and 300 were under construction. A ship canal across the isthmus of Corinth was opened in 1893.

Weights, Measures, and Money.— The French metric system of weights and measures has been introduced into Greece by the government, but the people still adhere to the old system. In the latter the standard lineal measure was the pike, equal to 27 inches; the standard square measure was the stremma, nearly equal to one-quarter of an English acre; the standard weight was the oke = 2.8 pounds avoirdupois: 44 okes were equal to 1 cantar, or about 124 pounds avoidupois. The weights and measures of the metric system are called royal, to distinguish them from the old weights and measures. In this system the French measures of length, millimeter, centimeter, decimeter, and meter are called respectively gramma, daktylos, palame, and pecheus (cubit). The kilometer is called a stadion, and the myriameter skoinis. The new or royal measures of surface are the square pecheus = the square meter and the stremma = the are. The measures of capacity are the kybos, mystron, kotyle, litra, and koilon, respectively equal to the milliliter, centiliter, deciliter, liter, and hectoliter. The weights for gold, silver, and precious stones are the kokkos, obolos, and drachme, respectively equal to the centigram, decigram, and gram. The commercial unit of weight is the mna = 1,500 drachmes = 1½ kilogram. The talanton is equal to the quintal, and the tonos equal to the tonneau.

In 1875 Greece entered the monetary league of which the other members are France, Italy, Switzerland, and Belgium, and all the members of which have a monetary unit equal to the franc in value. The name of the Greek unit is the drachme, divided into 100 lepta, nominally equal to a franc but varying considerably in value.

Government and People.— As first drawn up by the allied powers in 1830 the Greek monarchy was nearly absolute, but in 1844 and again in 1864 important modifications were made. As settled by the present constitution the throne is hereditary according to the law of primogeniture in the family of King George. The king must be a member of the Greek Church. He attains his majority at the age of 18. The legislative authority is vested in a single chamber, called the Boulē, the members of which (proportioned in number to the amount of the population) are elected for four years by ballot by manhood suffrage. It meets every year on Nov. 1, unless called at an earlier date for special business. The executive power is exercised by the king through a responsible ministry. The Greek Church alone is established, but all other forms of religion enjoy toleration. The highest ecclesiastical authority, subject to the king, is vested in a permanent synod which sits at Athens and consists of five members appointed by the king from the highest dignitaries of the Church. There is 1 metropolitan, who has his seat in Athens, 21 archbishops, and 29 bishops, who are presented and ordained by the synod, and confirmed and invested by the king. Justice is administered on the basis of the French civil code by a supreme court (*Areios Pagos*), which has its seat in Athens; five higher courts, one in Athens, one in Nauplia, one in Patras, one in Larissa, and one in Corfu; and a number of courts of primary resort (*Protodokeia*), in the principal towns. The public revenue, derived chiefly from direct taxes, customs, stamps, excise, monopolies, the rent of national property, etc., was estimated for 1900 at £3,703,951, and the expenditure at £3,537,427. In 1899 the amount of debt was about £30,500,000. A considerable portion of the debt incurred in recent years has been in the way of raising loans for the making of railways. Of the foreign debt one loan is guaranteed by Great Britain, France, and Russia, which have latterly had to pay the dividends on it, and which are now accordingly heavy claimants on Greece. The payment of the interest on its public debt has long been with Greece a matter of difficulty. Every male Greek on attaining the age of 21 years is liable to military service, his term being 2 years with the colors, 10 with the reserve, 8 in the national guard, and 10 in the national guard reserve. The army in 1900 numbered about 25,000 on a peace footing, expanding easily to 82,000 in time of war. The navy in 1900 consisted of 5 armor-clad ships, 51 torpedo boats, besides several unprotected gun vessels and cruisers.

The population contains a considerable intermixture of foreign stocks, among which the Albanese, or Arnauts, are the most numerous; but the great majority, though not without some taint in their blood, are of genuine Greek extraction, and both in physical and mental features bear a marked resemblance to their celebrated forefathers. It is true that the degrading bondage to which they were subjected for centuries has sunk them far below their natural level, and too often substituted sycophancy and low cunning for the intellectual superiority which, in earlier and better times, displayed itself in immortal productions of the chisel and the pen; but that the original elements of greatness still exist has been proved by the noble struggles

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which they have made for independence. The educational system of Greece, organized in 1834 by George Gennadius, one of the leaders of the war of independence, is very complete. There are three grades of schools, the demotic or primary national schools, the Hellenic or secondary grammar schools, and the gymnasia, in which, it is asserted, the range and the level of the teaching are much the same as in a German gymnasium or in the upper parts of our public schools. In all three grades of schools education is gratuitous, and in the primary schools it is compulsory on all children between 5 and 12. There is a university at Athens, attended by nearly 3,000 students, many of whom come from districts under the rule of the Sultan. Thus far, however, education seems to be actually diffused among the people only to a limited extent, though the numbers that receive a university education are so great that many such young men find themselves without any proper sphere of employment, and are obliged to adopt the career of politician and place-hunter. Many of these are now, however, said to be finding better ways of turning their education to account through the rapid development of trade and industry. The national dress of the Greeks resembles the Albanian costume. In the men it consists of a tight jacket, generally scarlet, a white linen kilt in numerous folds, a bright-colored sash round the waist, and embroidered gaiters; in the women it consists of a vest or jacket fitting close to the shape, and a skirt, on the head a kind of fez or skull-cap.

History.— From the year 1715 till 1821 the Greeks were subject to the domination of the Turks. In 1770, and again in 1790, they made attempts at insurrection, which, however, were speedily frustrated. In the early years of the 19th century a secret society was formed for the purpose of effecting their liberation from the galling yoke, and in 1821 they found an opportunity of breaking out into another insurrection which in the end proved successful. In that year Ali, the Pasha of Janina, revolted against the Sultan Mahmoud II., and secured the aid of the Greeks by promising them their independence. The rising of the Greeks took place on March 6, under Alexander Ypsilanti, and on Jan. 1, 1822, they published a declaration of independence. In the same year Ali was assassinated by the Turks, but the Greeks nevertheless continued the struggle that they had begun, and in which they were encouraged by the sympathy of nearly all the nations of Europe. Among the most distinguished of their leaders were Marcos Bozzaris, Capo d'Istria, Constantine Kanaris, Kolocotroni, Miaulis, Mavrocordato, Mavromichaelis, etc. In 1823 they were joined by Lord Byron, who, during the last year of his life, did all in his power to further their cause by his wealth, as well as by his active efforts on their behalf. Unfortunately he died in the April of the following year. In 1825, the Turks having called to their aid Mehemet Ali, the Pasha of Egypt, the latter sent his son, Ibrahim Pasha, whose talents secured them the success that they had hitherto been unable to attain. Tripolitza, the capital of the Morea, was taken, as was also Missolonghi, in spite of the valor of the Suliote mountaineers. It was about this time that the Greek patriots received the aid of the English admiral Lord Cochrane, who organized their fleet, and of the French Colonel Fabvier, who instructed their army in the system of European tactics. In spite of this, however, the Turks continued to triumph everywhere, and resisted all the pressure that was put on them by other European powers to make concesisons.

A treaty was then concluded at London (July 6, 1827) between Great Britain, France, and Russia, for the pacification of Greece, and when the mediation of these three powers was declined by the Sultan, their united fleets, under Admiral Codrington, attacked and annihilated the Turkish fleet off Navarino, Oct. 20, 1827. In the beginning of the following year (1828) Count Capo d'Istria became president of the State, and later on in the same year Ibrahim Pasha was forced to evacuate Greece. At last, on Feb. 3, 1830, a protocol of the allied powers declared the independence of Greece, which was recognized by the Porte on April 25 of that year. The new member of the States of Europe received from the allies a monarchical form of government, and offered the crown to Leopold, Prince of Saxe-Coburg, and when he refused it, to Otho, a young prince of Bavaria. The latter accepted the offer, and was proclaimed King of the Hellenes at Nauplia on Aug. 30, 1832. The power of the king was at first almost absolute, and his arbitrary measures, and more especially the preponderance which he gave to Germans in the government, soon made him unpopular. At the same time the finances of the kingdom were in a very embarrassed condition, and a general uneasiness prevailed. In 1843 a rebellion took place, after which a constitution was drawn up. But Otho was after that no more popular than before, and after the outbreak of another rebellion in February 1862, he saw himself compelled to abdicate the throne (Oct. 24). A provisional government was then set up at Athens, and the National Assembly, after declaring that the throne had been forfeited by Otho, offered it in succession to Prince Alfred of England and Prince William George of Denmark. The latter accepted it, and on March 30, 1863, was proclaimed King George I. At the end of that year a constituent assembly was elected for the purpose of framing a new constitution, and the result

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of its labors was the constitution which is still in force.

In 1864 an addition was made to the small kingdom by the annexation of the Ionian Islands which had hitherto formed an independent republic under the protection of Great Britain. From the first Greece has been watching for an opportunity of extending its frontier N., so as to include the large Greek population in Thessaly and Epirus. In January, 1878, during the Russo-Turkish War, Greek troops were moved into Thessaly and Epirus to the assistance of their brethren who had risen there, but on the remonstrance of England these troops were withdrawn. The treaty of Berlin made no definite provisions for any extension of the Greek territory, but in 1881 Turkey had to cede about 5,000 square miles of Thessaly to Greece. After the union of Eastern Rumelia with Bulgaria in 1885, war with Turkey was only prevented by the great powers. In 1896 an insurrection of the Christians in Crete led to the interference of Greece and to war with Turkey. The Turks speedily drove back the Greeks from the N. frontier and overran Thessaly; and Greece was enabled only through the efforts of the great powers to obtain reasonable terms of peace (see GRECO-TURKISH WAR). The recent internal political history of Greece relates mainly to her financial obligations. After the expulsion of the Turkish troops from Crete in 1898 the Crown Prince George was appointed high commissioner of the island.

Modern Greek Language and Literature.— The Greek language seems to have preserved its purity longer than any other known to us; but a deadly blow was inflicted when the Greeks were enslaved by the fall of Constantinople (A. D. 1453). All the cultivated classes, who still retained the pure Greek, the language of the Byzantine princes, either perished in the conflict or took to flight, or courted the favor of their rude conquerors by adopting their dialect. In the lower classes only did the common Greek survive (the *koine, demodes, haplc, idiotike dialektos*) the vulgar dialect of the polished classes, the traces of which occur, indeed, in earlier authors, but which first appears distinctly in the 6th century. This Greek patois departed still more from the purity of the written language — which took refuge at court, in the tribunals of justice, and the halls of instruction — when the Frank crusaders augmented it by their own peculiar expressions, and the barbarians in the neighborhood engrafted theirs also on it. This popular dialect first appears as a complete written language in the chronicles of Simon Sethos, in 1070–1080. After the Ottomans had become masters of the country all the institutions which had contributed to preserve a better idiom perished at once. The people, left to themselves, oppressed by the most brutal despotism, would finally have abandoned their own dialect which became constantly more corrupt, had not the Greeks possessed a sort of rallying point in their Church. But even here, owing chiefly to the ignorance and corruption prevailing among the clergy, little could be found to prevent the further debasement of this fine dialect, which continued till the middle of the 18th century. About this time many of the Greeks began to resort for instruction to the universities of the West, whence they returned to their native country to animate their fellow countrymen with the desire of making nearer approaches to the more civilized nations of Europe, so as not to remain behind in the general progress. One consequence of this was the Greeks began to pay more attention to their mother tongue, and this tendency was increased by intercourse with the more refined West by means of more frequent visits from intelligent men of that quarter to the ruins of Grecian greatness. The Patriarch (Samuel Eugene Bulgaris Theotokos) of Corfu, and the unfortunate Rhigas may be mentioned as eminent at this period.

At first a large part of the literature of awakened Greece consisted of translations from the French, but the country now furnishes original writers in every department of literature. Among the theological works of modern Greece perhaps the most remarkable is that "On Truth," by Pharmakidis (1852), which is one of the most important works in the modern Greek language. The philosophical and mathematical sciences are all well represented. For these branches of knowledge much has been done by the University of Athens, many of the professors of which have published manuals (some of which have no inconsiderable scientific value) on the subjects on which they lecture. With the exception of poetry, history is perhaps the department which has attracted most writers in the modern Greek language. On this head the long and learned dissertations prefixed by Spiridion Zampelios to his "Popular Songs of Greece" (Corfu, 1852), and "Studies on Constantinople" (1858), affording valuable and interesting materials for the history of Greece in the Middle Ages, deserve to be particularly mentioned. In the department of philology and scholarship Coray has performed important services by collecting a large mass of materials for acquiring a more thorough knowledge both of ancient and modern Greek; and after him Doukas, Darbaris, Asopios, and Rhangabe, ought to be noticed for their editions of the ancient classics with commentaries in modern Greek. At the head of the orators of the time of the struggle for independence stands Trikoupis, some of whose speeches were collected and published in 1829, and a sec-

ond and enlarged edition of them in 1860. In the department of poetry a distinction must be made between that of the people and that of the cultivated classes. The former is represented chiefly in the songs of the Klephts and other songs dating from the war of independence, which are a faithful mirror of the public life at the time to which they belong. At this period the war songs of Rhigas were caught up by the whole nation and sung with enthusiasm. At a later period the two Soutzos, Panagios and Alexander, Calvos, Solomos, and others, earned distinction in the same kind of poetry. The Soutzos were distinguished also as dramatists and novelists, and Alexander also as a satirist. Among the other leading dramatists are Rizos Neroulos and Zampelios. The most distinguished recent author, both a poet and a scholar, is A. R. Rangabé, while Demetrius Bikelas is the chief novelist.

Modern Greek, as spoken by the uneducated classes, is called Romaic, from the fact that it took on its special character at the time when the Greeks considered themselves as natives of the Roman empire, and hence called themselves Romaioi, or Romans. The Greek of the educated classes, that used in the newspapers and other literature of the present day, is distinguished from it by a greater resemblance to the Greek of antiquity, which renders it easy for any one who has a satisfactory acquaintance with ancient Greek to read the literary Greek of the present day. The domain of the Romaic comprises not only the whole of the present kingdom of Greece (including Thessaly), but also part of Rumelia, Albania, and Anatolia, the islands of Crete and Cyprus, as well as the islands of the archipelago not belonging to Greece. The purest Romaic is spoken in the less frequented isles of the Archipelago, and in some of the mountainous districts of the interior. It is in these districts particularly that modes of expression are still found belonging to the most classical antiquity. At Megara the language is less corrupt than at Athens, where it is mixed with a considerable number of Italian words. In the N. provinces it is mixed chiefly with Albanian. Besides the foreign words which have been introduced in Northern Greek, quite a large number of words are found which have changed their original signification though they have retained their original form. Ancient words are mostly found in significations the most remote from the original or derivative sense.

The Greek grammar has also undergone considerable modifications. For example, the numbers have been reduced to two by the suppression of the dual; and the cases to four, by the disappearance of the dative, the signification of which is now expressed by means of a proposition with the accusative. The first of the cardinal numerals is now used as an indefinite article. The degrees of comparison are sometimes expressed by the ancient inflexions, but at other times by the use of *pleon* (more). The past tenses of the verb are formed by the aid of the verb *echo* (I have), and the future tenses by the aid of *thelo* (I will). The infinitive mood, which has fallen out of use, has its place supplied by a periphrasis, in which the verb is put in the subjunctive. The middle voice has disappeared, and what remains of the old conjugation may be regarded as an irregularity.

Greek Church, the Eastern Church, that of the old Eastern empire, which prior to the Turkish conquest, had its metropolis at Constantinople, as distinguished from the West Church, which had its capital at Rome; the church of the people speaking the Greek language rather than that of the Roman nation.

History.— That the Eastern and Western Churches would first disagree, and then separate, was insured from the first by the difference in their mental constitution. The Greeks were notable for intense intellectual acuteness, which they used to frame hair-splitting subtleties of doctrine. The Romans, on the contrary, who had the imperial instinct, employed the new faith as a means of building up again a world-embracing dominion, with the "eternal city" as its capital. The first variance between the East and the West arose in the 2d century regarding the time of keeping Easter. The disputes which succeeded were chiefly as to personal dignity. As long as Rome was the metropolis of the empire, the Bishop of Rome had indisputably the most important see in the Church; but when, on May 11, 330, Constantine removed the seat of government to Byzantium (Constantinople), the bishop of the new metropolis became a formidable rival to his ecclesiastical brother at Rome. In the second General Council, that of Constantinople, 381, the Bishop of Constantinople was allowed to sit next to the Bishop of Rome; by the 28th canon of the Synod of Chalcedon, 403, he was permitted to enjoy an equal rank. In 588, John, Patriarch of Constantinople, assumed the title of œcumenical or universal bishop, for which he was denounced by Pope Gregory the Great. Disputes in the 8th century about image-worship widened the breach, as did the continued rejection by the Greek Church of the word Filioque, asserting the procession of the Holy Ghost from the Son as well as from the Father, introduced by the second Council of Constantinople, 381. The last General Council in which the Churches of the East and the West were united was the Seventh, or Second Council of Nice, 787. The feud continued through the 9th and on to the 11th

century. In the 13th an effort was made by Michael Palæologus to promote a reunion of the two great Churches at the Council of Florence, but all was in vain. They have remained separate till now. Efforts are said to be on foot looking to the union of the Greek and Roman Churches.

Doctrine and Discipline.— The Bible as now interpreted by tradition is the rule of faith. Regarding the Trinity, the divinity of Christ, the Atonement, and the work of the Holy Spirit, the Greek Church holds the ordinary faith of Christendom. Regarding what is termed the procession of the Holy Ghost, the East holds that he proceeded from the Father only, while the Churches of the West believe that he did so from the Father and Son (fifth of the Thirty-nine Articles). With regard to the decrees of God, the Greek tenets are what would now be called strongly Arminian. Worship of a superior or of an inferior kind is rendered to the Virgin Mary, to saints and angels. The secular clergy are enjoined to marry once, and with a virgin. Images are in use. The communion is administered even to the laity in both kinds. The doctrine of purgatory is not accepted. Baptism is by immersion, and is followed by chrism or anointing. The government is episcopal. Excepting the Church of Rome, the Greek Church is the largest Christian organization, though it would be only the third if the several Protestant Churches were united into one. Its political importance arises mainly from the fact that the Emperor of Russia is regarded as its earthly head. It is the most numerous Christian body in the Turkish empire, and has a patriarch at Constantinople. It has many adherents also in the heterogeneous Austrian empire. The Russian Emperor Nicholas delighted to call it "the orthodox faith." See ORTHODOX.

Greek Fire, a composition supposed to have been of pounded resin or bitumen, sulphur, naphtha (the principal ingredient), and probably niter, with which, from about 673 A. D. onward the Greeks of the Byzantine empire were wont to defend themselves against their Saracen adversaries. The mixture appears to have been highly inflammable, and to have been difficult to extinguish; though the actual destruction caused by it was hardly proportionate to the terror it created. It was poured out, burning, from ladles on besiegers, projected out of tubes to a distance, or shot from balistæ, burning on tow tied to arrows. The invention of this material has usually been ascribed to Callinicus of Heliopolis, and to the year 668 A. D. At Constantinople the process of making Greek fire was kept a profound secret for several centuries. The knowledge, however, of its composition gradually spread; and the use of it spread to the West. Subsisting for some time concurrently with gunpowder, it gradually died out before the advances of that still more effective competitor. Combustibles with a similar aim were used at the siege of Charleston in 1863, composed of sulphur, niter, and lampblack; and naphtha in shells was also tried. The petroleum bombs of the Paris Commune of 1871 correspond more nearly to Greek fire than does gunpowder.

Greek Wines, though formerly well known under the names of Cyprus and Malmsey, are now less known than they deserve, being strong, rich, full wines. Thera is said to be peculiarly luscious; Patras resembles hock; St. Elie and Kephisia are respectively of the Amontillado and Chablis character. The Noussa, Patras, and Kephisia red wines have some kinship with the unfortified Rhone or Burgundy wines. Vinsanto and Lachrymæ Christi, the former white, the latter red, are excellent dessert wines, and the Santorin wines are also favorably known.

Greeley, Horace, an American journalist; born in Amherst, N. H., Feb. 3, 1811. About 1825, his parents having removed to Vermont, Horace, who had always been a lover of books, obtained employment as an apprentice in a printing office for five years. He learned the business rapidly, became an accurate compositor; and later was intrusted with a portion of the editorial work on the "Northern Speculator" till the paper was suspended, when he was released from his apprenticeship, and worked with his father on the farm. He later decided to seek his fortune in New York, and arrived there in August, 1831, and secured occasional work as a journeyman printer in various offices. In 1834, in partnership with Messrs. Winchester and Gibbett, he started "The New Yorker," a weekly literary journal, which, after several years' trial proving unprofitable was abandoned, and in 1841 he commenced the publication of the New York "Tribune," a journal which has been eminently successful. In 1848 he became a member of the 30th Congress; in 1851 he visited Europe, and was chosen chairman of one of the juries of the Great Exhibition in London, and afterward published an account of his travels. He assisted his brother-in-law in editing "A Political Text-book"; and wrote "Glances at Europe", "Overland Journey to San Francisco", "Essays Designed to Elucidate the Science of Political Economy", "What I know of Farming", "Hints Toward Reforms," "History of the Struggle for Slavery Extension" (1856); "The American Conflict" (1864–1866);

"Recollections of a Busy Life" (1868). He ardently supported the Union cause during the Civil War. In 1872 he was nominated by the Democratic party a candidate for the presidency in opposition to General Grant, but he failed to be elected. His strong constitution became impaired by excessive toil and excitement. The loss of his wife, who was a hopeless invalid many years, served to complete the fatal work. He died in Pleasantville, Westchester Co., N. Y., Nov. 29, 1872.

Greely, Adolphus Washington, an American Arctic explorer; born in Newburyport, Mass., March 27, 1844. He served as a volunteer through the war of 1861–1865, and shortly after its conclusion entered the regular army as lieutenant, and in 1868 was placed on the signal service. In 1881 he was selected to conduct the American expedition to the head of Smith Sound, for the purpose of carrying on observations in pursuance of the international scheme arranged at Hamburg in 1879. He and the survivors of his party were rescued in June, 1883, when at the point of perishing from starvation, after spending three winters in the Arctic regions. Their sufferings were so extreme that some of the party had even been reduced to eating the bodies of the dead. Lieutenant Lockwood of this expedition traveled to within 396 miles of the geographical pole, the farthest point N. hitherto reached. In 1887 Greely was appointed chief of the signal service, with the rank of a Brigadier-General. He published "Three Years of Arctic Service" (1886).

Green, Anna Katharine, the maiden name and pseudonym of Mrs. Rohlfs, an American author; born in Brooklyn, N. Y., Nov. 11, 1846. She graduated at Ripley (female) College, Poultney, Vt., 1867. Her novels are detective stories, and enjoy great popularity. "The Leavenworth Case" (1878) is one of her best. Included in her publications are: "Risifi's Daughter" (1866), a dramatic poem; "The Sword of Damocles"; "A Strange Disappearance"; "Hand and Ring"; "The Mill Mystery"; "Behind Closed Doors"; "X, Y, Z"; "That Affair Next Door"; "Lost Man's Lane" (1898); "Agatha Webb" (1899); "The Circular Study" (1900); etc.

Green, John Richard, an English historian; born in Oxford in 1837; received his early education at Magdalen College School and under private tutors, and gained a scholarship at Jesus College. Immediately after taking his degree in 1860 he was appointed curate of St. Barnabas, King Square, in the East End of London, and in 1866 to the vicarage of St. Philip's, Stepney. While still continuing his historical studies he never neglected his parish duties — duties made infinitely more arduous by the visit of the cholera in 1868. Soon after that year, however, the state of his health compelled him to resign his living, and he was appointed to the post of Lambeth librarian by Archbishop Tait. His work as librarian occupied but little of his time, and he now collected and digested the materials for a projected history, which was completed and published in 1874 under the title of "A Short History of the English People." The author recast it on a larger scale, the new book appearing at intervals between 1877 and 1880 in 4 vols. In recognition of his literary ability his college at Oxford made him an honorary fellow, and the University of Edinburgh gave him the degree of LL. D. He also projected and edited a series of "History and Literature Primers," which have had much success. In 1881 was published his last important work, a volume on the beginnings of English history, entitled "The Making of England," which is one of the most valuable works of its kind in the language. In spite of repeated winter visits to the Continent he never recovered sound health, and on May 7, 1883, he died in Mentone. An unfinished work of his, "The Conquest of England," was published after his death. The 1888 edition of the "Short History" contains a sketch of Green's life by his wife, Alice Stopford. In 1892–1893 she and Miss Norgate issued an illustrated edition of the work.

Green, Seth, an American pisciculturist; born in Irondequoit, N. Y., March 19, 1817. With slight scientific acquirements, but with sound practical judgment, essentially a self-made man, he has a right to be considered one of the fathers of fish culture. He soon became the leading expert in trout culture, but that did not satisfy him. He was eager to solve other problems, and he sought to work out the more difficult one of hatching the eggs of the shad. To him is due the entire credit of having been the first to make the reproduction of shad possible. The Seth Green shad-hatching box was devised by him in 1867, and by its use the Connecticut river was restocked. We have since then abandoned the method invented by Green, but it was as much of a discovery on his part as the finding of the Fortunate Islands by Christopher Columbus. In 1868 he was made one of the fish commissioners of the State of New York. In 1869 he directed his attention to the propagation of white fish, and with marked success. In 1871 Green carried young shad from the Atlantic side of the Continent to the Pacific. In 1870 he became superintendent of the State hatchery at Caledonia, which position he held till his death in Rochester, N. Y., Aug. 20, 1888.

Green, Thomas Hill, an English philosopher; born in Birkin, Yorkshire, England, April 7, 1836. He was educated at

Rugby, and Balliol College, Oxford, taking there in 1859 a first-class in *litteræ humaniores*, later a third in law and modern history, and in November 1860 being elected to a fellowship in his college, to which he was reëlected in 1872, becoming also its first lay tutor in 1866. He married a sister of John Addington Symonds in 1871, and was appointed in 1877 to be Whyte's Professor of Moral Philosophy. He wrote "Prolegomena to Ethics"; "Works" (3 vols. 1885–1888); etc. He died March 26, 1882, leaving £1,000 to the university for a prize essay in the department of moral philosophy, £1,000 to found a scholarship at the Oxford High School for boys, and £3,500 to Balliol College for the promotion of higher education in large towns.

Green, William, an American clergyman; born in Groveville, N. J., Jan. 27, 1825; was graduated at Lafayette College in 1840 and at the Princeton Theological Seminary in 1846; was ordained in the Presbyterian Church in 1848; was made Professor of Oriental and Old Testament Literature at Princeton Theological Seminary in 1851; and was chairman of the Old Testament Committee of the Anglo-American Bible Revision Committee. In 1868 he declined the presidency of Princeton College. His publications include "A Grammar of the Hebrew Language" (1861); "A Hebrew Chrestomathy" (1863); "The Argument of the Book of Job Unfolded" (1874); "Moses and the Prophets" (1883); "Hebrew Feasts" (1885); "The Unity of the Book of Genesis" (1895); and a "General Introduction to the Old Testament." He died in Princeton, N. J., Feb. 10, 1900.

Green, William Mercer, an American clergyman; born in Washington, N. C., May 2, 1798; was graduated at the University of North Carolina in 1818; was ordained in the Protestant Episcopal Church; became Professor of Belles-Lettres in the University of North Carolina in 1837; and was consecrated first bishop of Mississippi in 1850. His publications include "The Influence of Christianity upon the Welfare of the Nations" (1831); "Memoir of the Right Reverend Bishop Ravenscroft, of North Carolina"; etc. He died in Sewanee, Tenn., Feb. 13, 1887.

Green, the color of growing herbage; the color of the solar spectrum between blue and yellow; a secondary color composed of the primaries blue and yellow in different proportions. In painting, green pigments are derived chiefly from the mineral world, and owe their color to the presence of copper. Among the most valuable to the painter are malachite or mountain green, terra verte, Veronese green, native carbonate of copper, cobalt green, and chrome green. In botany, a genus of colors, in Latin, *viridis*, in words of Greek composition, *chloro*. The typical species called simply green is a clear green, less bright than grass green; virens, virescens, viridulus, and viridescens are shades of it. The other species are grass-green, verdigris-green, sea-green, deep-green, yellowish-green, and olive-green.

Greenaway, Kate, an English artist; especially famous for her pictures of child life. His first book was "Under the Window," followed by illustrations for "Pied Piper of Hamelin," "Marigold Sarden," "Mother Goose," etc., and two books of her own, "A Painting Book for Boys and Girls," and "Kate Greenaway's Alphabet." She died in London, Nov. 8, 1901.

Greenback Party, in the United States, called by its members the Independent National party, was organized in 1876, and was the outgrowth of the Granger and Labor Reform movements. Its convention at Indianapolis in May, 1876, "demanded the unconditional repeal of the Specie Resumption Act on Jan. 14, 1875"; urged the issue of United States notes as a circulating medium, and the suppression of bank paper; and protested against the further issue of gold bonds, and the purchase of silver to replace the fractional currency. Peter Cooper was nominated for President, and received 81,740 votes. In 1880 its candidate was James B. Weaver, who received 306,305 ballots. It has never gained any electoral votes. In 1884 the party indorsed the nomination of Benjamin F. Butler by the People's party, which polled 175,370 votes.

Green Bay, a city and county-seat of Brown co., Wis.; on Green bay, the Fox river, and the Chicago and Northwestern, the Chicago, the Milwaukee and St. Paul, the Green Bay and Western, and the Kewaunee, Green Bay and Western railroads; 565 miles N. N. E. of Fond du Lac. It is at the head of lake and the foot of river navigation; has an ample harbor, and carries on a large trade in lumber, coal, grain, flour, cheese, etc. It has waterworks, electric lights, and street railroads, 3 National banks, public library, high school, several Roman Catholic and Lutheran parochial schools, and an assessed property valuation of nearly $5,000,000. In 1901 the United States government had under construction a ship canal to connect the Mississippi river with Lake Michigan, using the Wisconsin and Fox rivers, the cost of which was estimated at over $10,000,000. Pop. (1890) 9,069; (1900) 18,684; (1910) 26,236.

Greenbrier, a popular name in the United States for a very common thorny climbing shrub, *Smilax rotundifolia*, having a

yellowish-green stem and thick leaves, with small bunches of flowers.

Greenbush, formerly a town now a part of Rensselaer city, in Rensselaer co., N. Y., on the Hudson river and the Boston and Albany and the New York Central and Hudson River railroads; opposite Albany, to which it is joined by a bridge. It contains pork-packing, manufacturing and milling plants, but is noted chiefly for containing the machine shops and freight houses of the Boston and Albany railroad. See RENSSELAER.

Greencastle, a city and county-seat of Putnam, Ind. on the Cleveland, Cincinnati, Chicago and St. Louis, the Louisville, New Albany, and Chicago, and the Vandalia line railroads; 39 miles W. of Indianapolis. It contains De Pauw University, a female college, a high school, waterworks, electric lights, and 2 National banks; and has manufactories of lightning rods, pumps, novelty goods, etc. Pop. (1890) 4,390; (1900) 3,661.

Green Dragon, a North American herbaceous plant, the *Arisæma Dracontium*, one of the arum family, called also wake-robin. For another green dragon, see DRACUNCULUS.

Greene, Aella, an American journalist and poet; born in Chester, Mass., in 1838. He was connected with the press in Springfield, Mass. His works include: "Rhymes of Yankee Land"; "Into the Sunshine" (1881); "Stanza and Sequel" (1884); "Gathered from Life." He died in 1903.

Greene, Albert Gorton, an American lawyer and poet; born in Providence, R. I., Feb. 10, 1802. He wrote the famous poem "Old Grimes." Died in Cleveland, O., Jan. 4, 1868.

Greene, Asa, an American author; born in Ashburnham, Mass., in 1788. He graduated at Williams College, and in 1827 received a degree from the Berkshire Medical School. He was a bookseller of the old-fashioned kind, and noted as a humorist. He served for some time as editor of the New York "Evening Transcript." His publications include: "Adventures of Dr. Dodimus Duckworth, A. N. Q."; to which is added, "The History of a Steam Doctor" (1833); and "Debtor's Prison" (1837). He died in New York city in 1837.

Greene, Francis Vinton, an American military officer; born in Providence, R. I., June 27, 1850. He graduated from West Point in 1870, and served till 1886, when he resigned with the rank of captain. He was assistant astronomer on the Northwest Boundary Survey from 1872 to 1876, and was attached to the headquarters of the Russian army during the Russo-Turkish War of 1877–1878. In 1898 he was commissioned Major-General U. S. V. and served principally in the Philippines, and in 1903 was police commissioner of New York. His chief works are: "The Russian Army and its Campaigns in Turkey" (1879); "Army Life in Russia" (1880); "The Mississippi" (1882); "Life of Nathanael Greene" (1893), and a detailed report on the Philippine Islands (1899).

Greene, George Sears, an American military officer; born in Warwick, R. I., May 6, 1801; was graduated at the United States Military Academy in 1823; resigned from the army in 1836, and engaged in civil engineering. In 1856 he entered the employ of the Croton Aqueduct Department of New York city and during this service built the reservoir in Central Park; enlarged High Bridge, and constructed a new reservoir near it. In January, 1862, he was appointed Brigadier-General of volunteers, and from that time served through the Civil War, participating in many important actions. He was commissioner and chief engineer of the Croton Aqueduct Department in 1867–1871; chief engineer of the public works in Washington, D. C., in 1871–1873; and planned the sewer system of that city. He died in Morristown, N. J., Jan. 28, 1899.

Greene, George Washington, an American historian, grandson of Gen. Nathanael Greene; born in East Greenwich, R. I., April 8, 1811. Among his works are: "History and Geography of the Middle Ages" (1851); "Historical View of the American Revolution" (1865); "Life of Nathanael Greene" (1867–1871). He died in East Greenwich, R. I., Feb. 2, 1883.

Greene, Homer, an American story-writer; born in Ariel, Pa., in 1853; was the author of "The Blind Brother, a Story of the Pennsylvania Coal Mines" (1887); "Burnham Breaker" (1887); "Riverpark Rebellion."

Greene, Louisa Lelias, an English writer of juveniles; born (third Lord Plunket's daughter) in 1833. Her works, widely popular, include: "A Winter and Summer at Burton Hill" (1861); "Cushions and Corners" (1864); "The Schoolboy Baronet" (1870); "Gilbert's Shadow" (1875); "Jubilee Hall" (1881). She wrote with her cousin W. H. Wills the dramatist: "Drawing-Room Dramas"; "Prince Crœsus in Search of a Wife" (1873), a translation.

Greene, Nathanael, an American military officer; born in Warwick co., R. I., May 27, 1742. His school education was of the simplest and most limited character; but by his own industry he soon acquired a tolerable knowledge of the principal branches of an English education, including history and mathematics. He made some

progress in the study of law; he also early evinced a decided predilection for books treating on the art of war. On the commencement of the troubles between the colonies and Great Britain he volunteered as a private (1774); but the following year he was chosen, by the Assembly of Rhode Island, general of the contingent furnished by that colony to the army near Boston. He was made Major-General in the Continental army in 1776, and accompanied Washington on his brilliant expedition into New Jersey near the close of the same year. He performed a prominent part in the disastrous battle of Germantown (1777), on which occasion his courage and skill did much toward retrieving the reputation of the American arms. In 1778 he was appointed quartermaster-general, and for more than two years he fulfilled the duties of that position with faithfulness and ability. After the defeat of General Gates (1780) at the battle of Camden, S. C., he was appointed to the command of the S. army, which he found demoralized and in a state of utter destitution. His presence soon restored the confidence of the troops. Through his skillful strategy, even his reverses produced the fruits of victory. In March, 1781, he was defeated by Lord Cornwallis in the hard-fought battle of Guilford Court House, but the English general derived no permanent advantages from this success. Cornwallis having retreated into Virginia, Greene defeated, after a severe action (September, 1781), the forces of Colonel Stewart at Eutaw Springs, and thereby put an end to the British power in South Carolina. He died at Mulberry Grove on the Savannah river, June 19, 1786. His exact burial place was long in doubt; but in 1901 his coffin-plate and some buttons of his uniform were found in the Jones vault in Savannah.

Greene, Robert, an English poet and dramatist; born in Norwich, England, in 1560. He took his degree of A. B. at Cambridge University in 1578. He afterward traveled in Spain and Italy. On his return he reëntered the university, and took his degree of A. M. in 1583. On leaving Cambridge he proceeded to London, where he supported himself by writing plays and romances. One of the latter, "Pandosto: The Triumph of Time," supplied Shakespeare with hints for the plot of "The Winter's Tale." The most popular of his plays was "Friar Bacon and Friar Bungay." His literary fame rests on the poetry which he scattered through his romances — some of his pastoral songs being unsurpassed for tenderness and natural grace. After his death appeared his singular pamphlet entitled "A Groatsworth of Wit Bought with a Million of Repentance," in which he lays bare the wickedness of his former life. He died in London, Sept. 3, 1592.

Greene, Sarah Pratt (McLean), an American author; born in Simsbury, Conn., July, 1856. She was educated at Mount Holyoke Seminary. Her best-known book is "Cape Cod Folks" (1881), her first work, which was said to describe living persons, and involved her in lawsuits. Among her other works are: "Towhead, the Story of a Girl" (1884); "Lastchance Junction" (1889); "The Moral Imbeciles" (1898); "Vesty of the Basins" (1900); and "Winslow Plain" (1902).

Green Earth, an opaque, dull, olive-green, soft, earthy mass, generally met with in cavities in amygdaloidal rocks. It consists of silicate of iron and aluminum, with potassium and sodium and water.

Green Ebony, an olive-green wood obtained from the South American tree *Jacaranda ovalifolia*, natural order *Bignoniaceæ*, used for round rulers, turnery, marquetry work, etc., and also much used for dyeing.

Greenfield, a town of Massachusetts, the county-seat of Franklin co.; on the Connecticut river and the Boston and Maine railroad; 56 miles W. of Fitchburg, and 36 miles N. of Springfield. It contains Factory and North Parish villages; manufactures principally shoes, cutlery, silverware, machinists' tools, agricultural implements, children's carriages, etc. The town has two public libraries, the Franklin County Hospital, a soldiers' monument, and is the seat of the Prospect Hill School for young women. From its settlement in 1686 to 1753 it was a part of Deerfield (*q. v.*), and it shares in the historical interest of that place. It is a favorite summer resort. Pop. (1900) 7,927; (1910) 10,427.

Greenheart. See BEBEERU.

Green Isle, the same as EMERALD ISLE (*q. v.*).

Greenland, an extensive island belonging to Denmark; on the N. E. of the continent of North America, from which it is separated by Davis Strait, Baffin Sea, and Smith Sound; area about 850,000 square miles; pop. (1901) 11,893, chiefly Eskimos. A great part of its N. and precipitous E. coast is yet unknown; but it does not extend further than about lat. 83° 39′. Like the N. parts of North America generally, Greenland is colder than the corresponding latitudes on the E. side of the Atlantic. In June and July the sun is constantly above the horizon, the ice on the coast is broken up and floats S., and a few small lakes are opened; but the short summer is followed by a long and dreary winter. The high interior is uninhabitable, and about five-sixths of the entire surface is covered with a thick ice-cap (see GLACIERS). The villages are

on the coasts, which are fringed with islands and indented by fiords. The Danish colony extends N. on the W. coast to the Bay of Disco, in lat. 69° N. Cultivation is confined to the low shores and valleys, where grassy meadows sometimes occur with stunted shrubs and dwarfed birch, alder, and pine trees. Attempts to raise oats and barley have failed, but potatoes have been grown toward the S. extremity. Turnips attain the size of a pigeon's egg, and cabbages grow very small. The radish appears to be the only vegetable not checked in its growth. In the S. various kinds of berries yield a small supply of food.

The inhabitants are largely dependent on hunting and fishing. Whale blubber and seal oil are used as fuel. The land animals are the Esquimaux dog, the reindeer, the polar bear, the Arctic fox (blue and white), the ermine, the Arctic hare, and the musk ox. Among the amphibia the walrus and several species of seal are common. The seas abound in fish, the whale and cod fisheries being of special importance. Seafowl are abundant in summer, and largely killed. The chief mineral product is cryolite, but graphite and miocene lignitic coal are also found. Oil, eider down, furs, and cryolite are exported. For administrative purposes Greenland, or rather its coast, is divided into two inspectorates of North and South Greenland. The residences of the inspectors are at Disco Island and Godhaab, but the most populous district is Julianshaab.

Greenland was discovered by an Icelander named Gunnbjörn about 876 or 877, and was colonized from Iceland about the end of the 10th century. In the reign of Elizabeth Frobisher and Davis rediscovered the coast, but nothing was done to explore it till the Danish government in 1721 assisted Hans Egede, a clergyman, to establish a European mission settlement, Good Hope (Godhaab), which was successfully carried on by him and his son. Whale fisheries were established on the coast by the English and Dutch about 1590. The interior of the country was first crossed from E. to W. by Nansen in 1888. See ARCTIC EXPEDITIONS.

Greenlet, in ornithology, *Vireoninæ,* a sub-family of *Muscicapidæ* (flycatchers). They are so called from having much green or olive in the colors of their plumage. They are small birds, arriving in the United States from South America and the West Indies about the month of May, and departing again in August. Some of them sing sweetly.

Green Mountain Boys, a name applied to the male inhabitants of Vermont, from the chief range of mountains in the State, and used especially in referring to regiments from Vermont in the Revolution and the Civil War.

Green Mountains, a considerable mountain range commencing in Hartford co., Conn., and extending N. through Massachusetts and Vermont into Lower Canada; Length, about 240 miles. Their greatest elevation is in Vermont, where Mount Mansfield, or North Peak, rises to a height of 4,389 feet. Their geological formation is the metamorphic slates, gneiss, quartz rock, limestone, etc., of the Laurentian epoch, the general range of which is about N. 15° E., with a prevailing dip of 30° to 55°. The slopes are covered on the disappearance of the snow in spring with fine pastures of rich green grass, which may have given to the mountains their name, though this is commonly referred to the growth of evergreen forest trees, as the hemlock, balsam, fir, spruce, pine, cedar, etc., which abound upon the poorest land and along the margin of the streams.

Green Mountain State, a popular name for the State of Vermont, from its being crossed by the Green Mountains.

Greenock, a seaport of Renfrewshire, the fifth largest town in Scotland, on the S. shore of the Firth of Clyde, 3¾ miles by water S. of Helensburgh, and 22½ by rail W. N. W. of Glasgow. The W. end of the town, with its elegant villas of every style of architecture, its esplanade 1½ miles long, its wide and well-paved streets, planted with trees, is attractive. The public buildings are many of them handsome; chief among them is the town hall and municipal buildings (1886), Renaissance in style, with a tower 245 feet high; the county buildings (1867), the custom house (1818), the poorhouse and lunatic asylum (1876), Wood's Mariners' Asylum (1851), the temperance institute (1870), the Y. M. C. A. Institute (1887), and the Watt Institution (1837), containing a marble statue of Watt by Chantrey. There are several handsome churches. To Sir Michael Shaw-Stewart the town is indebted for the Well Park (1851), the Wellington Park (1872), and the Lyle Road (1880). The new cemetery, 90 acres in extent, with its Watt cairn, and fine waterworks (1827–1883) also deserve mention. The harbor works date from 1707, and have cost upward of $7,500,000. Shipbuilding has been carried on since 1760; sugar refining began in 1765, and there are also manufactures of steam engines, anchors and chain cables, ropes, sailcloth, paper, wool and worsted, etc. Besides being the birthplace of Watt, of Spence the mathematician, and of Principal Caird, it has memories of Rob Roy, John Wilson, and Galt, and contains the grave of Burns's "Highland Mary." Pop. (1901) 67,645.

Greenough, Horatio, an American sculptor; born in Boston, Mass., Sept. 6, 1805. He studied for two years at Harvard, and from 1825 spent the greater part of his life in Italy. His principal work was the colossal statue of Washington in front of the National Capitol. Other important sculptures are his "Medora," "Venus Victrix," and a group of four figures, "The Rescue," for the purpose of placing which he returned to the United States in 1851. He died in Somerville, Mass., Dec. 18, 1852.

Greenough, Sarah Dana (Loring), an American author; born in Boston, Mass., Feb. 19, 1827. Among her works are; "Treason at Home," a novel (1865); "Arabesques" (1871); "In Extremis, a Story of a Broken Law" (1872); and "Mary Magdalene," a poem (1880). She died in Franzensbad, Austria, Aug. 9, 1885.

Greenovite (named by Dufrénoy after G. B. Greenough, a celebrated geologist), in mineralogy, manganesian titanite, a red or rose colored variety of titanite, the hue produced by the presence of a little manganese.

Green Pigments. Those which are serviceable or have any special interest are:

Sap green, the only one of vegetable origin that need be mentioned. It is prepared from the gummy juice of the berries of a species of buckthorn (*Rhamnus catharticus*), and is a fine transparent yellowish-green. It is unfortunately fugitive, but is occasionally employed in water-color painting.

Terra verte, a kind of ocher. This pigment is much used by artists for painting in oil, being one of the most permanent greens. It has not much body, but can be mixed with other colors without injurious results.

Oxide of chromium, like the last, found native, but for use as a color always artificially prepared. It is a sober, permanent green much liked by some landscape-painters. *Viridian* and *Veronese green* are also oxides of chromium, but the latter is often adulterated with arsenic.

Emerald green (cupric aceto-arsenite). This very bright but poisonous green, also called Schweinfurt green, is only employed to a limited extent by artists and decorators, but is used for other purposes. It is fairly permanent.

Scheele's green (cupric arsenite) is another bright green, though not so vivid in color as the last, which it resembles in stability and in other properties. This is a dangerous pigment, and is unfortunately a good deal employed for coloring paper-hangings, artificial leaves, and toys.

Brunswick Green. Several distinct pigments are known by this name. One of the kinds employed by the house-painter is a basic carbonate of copper, mixed with gypsum or other bodies. It is fairly permanent. Mountain green, mineral green, and malachite green are also carbonates of copper. In chemical books Brunswick green is usually said to be the oxychloride of copper. Chrome green, noticed below, is likewise called Brunswick green.

Rinman's green, known also as zinc green and cobalt green, consisting of 88 per cent. of oxide of zinc and 12 per cent. of protoxide of cobalt. This color is permanent, and is not affected by strong heat.

Chrome green, a mixture of chromate of lead and Prussian blue. It is a bright, strong color, and is suitable for ordinary mechanical painting. It is, however, not permanent; a more durable green, but one of less power, being formed with French ultramarine and chrome yellow.

Hooker's green, a mixture of Prussian blue and gamboge, and possessing some permanence as a water-color. *Prussian green* is formed in the same way, but contains more blue.

Greens which are compounds of copper are all more or less poisonous even when they do not also contain arsenic. For the materials used in dyeing textile fabrics green, see DYEING and CALICO-PRINTING; and for green colors used in painting or printing pottery, see POTTERY.

Green River. (1) Rises in Western Wyoming, flows S. E. into Colorado, and then S. W. and S. through Utah, joining the Grand river, a branch of the Colorado, after a course of 750 miles. (2) Green river, Kentucky, rises near the center of the State, flows W. and N. W., passing near the Mammoth Cave, and crosses the N. boundary, entering the Ohio 9 miles above Evansville, Ind. It is about 350 miles in length; and is navigable for small steamers for 150 miles; its lower course is through the coal-fields of Western Kentucky. At Tebb's Bend, on this river, a smart action of several hours took place, July 4, 1863, between a body of Confederate raiders under Morgan, the famous cavalry leader, and about 200 Michigan troops under Colonel Moore, in which the former were repulsed with a loss of more than 200 killed and wounded. Moore, being intrenched, lost only 6 killed and 23 wounded.

Greens, the common name of all those varieties of kale or cabbage (*Brassica oleracea*) which do not boll, and of which the leaves are used for the table as boiled vegetables; some of which are also called colewort, etc., while others, particularly those with curled leaves, as German greens, have no other name than greens or kale. Young unbolled cabbages, and shoots from the stocks of cabbages, are often also called

greens, as well as turnip tops, and other leaves of plants used in the same manner. The leaves of German greens are very much waved or curled. This herb is one of the best kinds of open greens. It is either sown in spring and planted out soon after, or it is sown in autumn and planted out in spring.

Green Salt of Magnus, in chemistry, $Pt(NH_3)_4Cl_2+PtCl_2$. A double salt of platinous chloride with platinous tetramine chloride. Obtained by pouring a boiling solution of platinous chloride in hydrochloric acid into excess of aqueous ammonia. It is green crystalline powder, insoluble in water.

Greensand, in geology, the name given to two series of beds in the cretaceous formations, the one called the Upper, the other the Lower Greensand. The Upper Greensand is a subdivision of the Upper Cretaceous rocks, and is situated immediately below the Chalk marl, and just above the Gault. The beds of which it is composed have in them green particles of a mineral called glauconite. Among the fossils peculiar to it are various ammonites, two pterodontas, two species of fusus, etc. Of the derivative fauna, which is probably from the Gault, Mr. Sollas described coprolites constituting phosphatic nodules, and Professor Seeley, an ichthyosaurian, *Cetarthrosaurus Walkeri*, and other reptiles. Some are of opinion that the so-called Upper Greensand from which these fossils came is itself Gault. The Lower Greensand is a series of beds constituting the Lower Cretaceous rocks, and the lowest member of the cretaceous group. It is called in Europe Neocomian, a name adopted by Lyell in his "Students' Elements of Geology," he considering the term greensand peculiarly inapplicable, as in the district where these stratas were first observed sand of a green color was the exception instead of the rule.

Greensboro College, a non-sectarian educational institution for women in Greensboro, N. C.; under the auspices of the Methodist Episcopal Church, South; chartered in 1838; opened 1846; has grounds and buildings valued at over $200,000; endowment, $100,000; ordinary income, $35,000; average number of faculty, 18; average students, 200.

Greensburg, a town and county-seat of Westmoreland co., Pa.; on the Pennsylvania railroad; 31 miles E. S. E. of Pittsburg. It is in a coal-mining, coking and natural gas region; and contains a steamheating apparatus factory, steel works, glass works, nut and bolt works, and has 3 National banks, and an assessed property valuation of over $4,000,000. Pop. (1890) 4,202; (1900) 6,508; (1910) 13,012.

Green Sea, the Persian Gulf, so named from a remarkable strip of water of a bright green color along the coast of Arabia.

Greenstick Fracture, a term used when a bone is partially broken or cracked. This especially occurs in the bending of bone in young children, where the fracture is frequently incomplete or partial, simply extending across the convexity of the curve made by the bending instead of the breaking of the bone.

Greenstone, in petrology, formerly a granular rock, consisting of hornblende and imperfectly crystallized felspar, the felspar being more abundant than in basalt, and the grains or crystals of the two minerals more distinct from each other. It was called also dolerite. Sir Charles Lyell also included under the term greenstone those rocks in which augite was substituted for hornblende, the "dolorite" of some writers, and those in which albite replaced common felspar. This was sometimes termed andesite. The term is now used the same as diorite, which is an essentially crystalline granular admixture of triclinic felspar and hornblende. Rutley proposes a partial return to the earlier signification, and would use greenstone as an ambiguous and comprehensive term useful in field geology, but expressive of ignorance with regard to the exact composition of volcanic rocks, either decomposed or otherwise incapable of exact identification. It is not now held to be the equivalent of dolorite. In geology, is a volcanic rock occurring in dykes, tabular masses, etc.

Greenstone Trachytes, eruptive rocks, usually consisting of a more or less felspathic base, in which large crystals of plagroclase felspar, with others of hornblende and mica, are imbedded so as to give them a more or less strikingly porphyritic character; they are found in Hungary.

Greenstone Tuffs, tuffs associated with greenstone. Rutley places them in the diabase group of crystalline eruptive rocks.

Greenville, a city and county-seat of Washington co., Miss.; on the Mississippi river and the Southern and the Yazoo and Mississippi Valley railroads; about 140 miles S. of Memphis. It contains several cottonseed-oil, saw, and planing mills, a National bank, electric lights, weekly and monthly periodicals; and has steamboat connection with all important river ports and an assessed property valuation of over $3,000,000. Pop. (1890) 6,658; (1900) 7,642; (1910) 9,610.

Greenville, a city and county-seat of Darke co., O., on Greenville creek, and the Cincinnati, Jackson and Mackinaw, the Dayton and Union, and the Pittsburg, Cincinnati, Chicago, and St. Louis railroads;

35 miles N. of Dayton. It is noted as the site of Anthony Wayne's treaty with the Indians. There are waterworks, electric lights, grain elevators, 2 National banks, a public library, daily and weekly newspapers, and an assessed property valuation of over $3,000,000. Pop. (1890) 5,473; (1900) 5,501; (1910) 6,237.

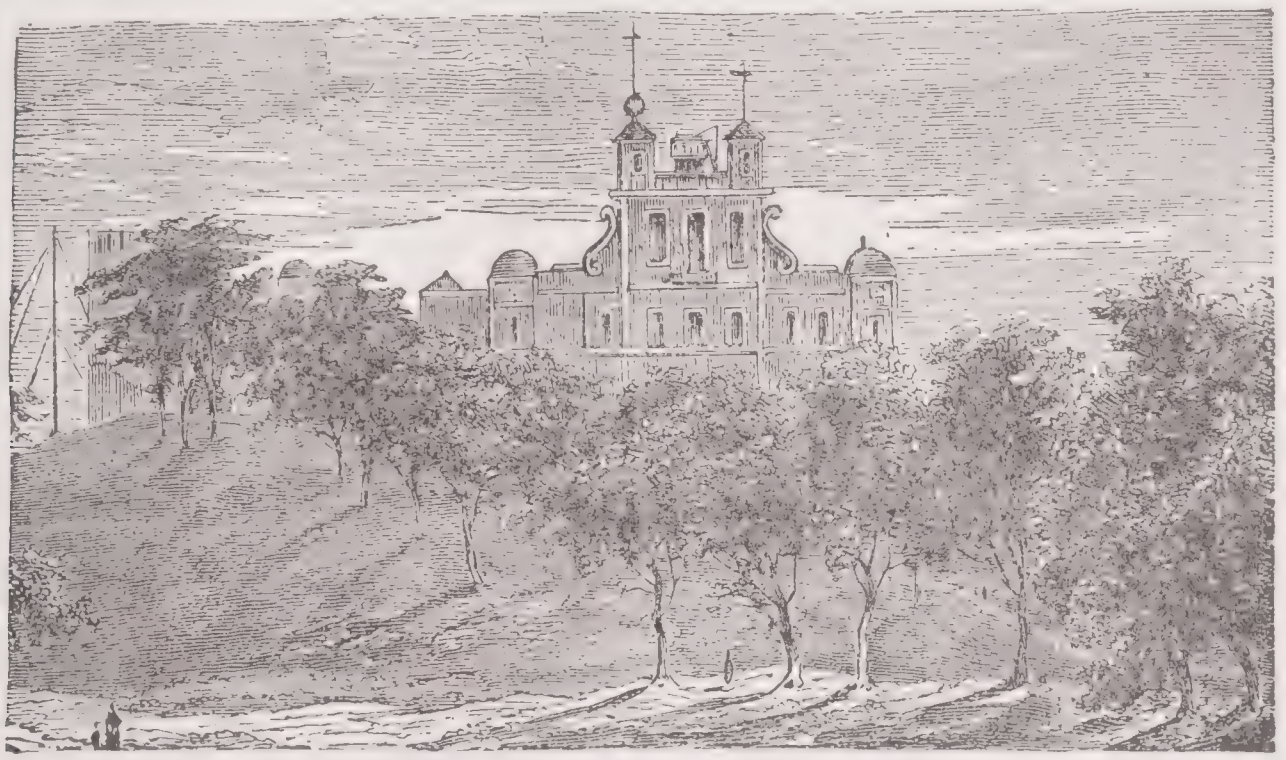
Greenville, a city and county-seat of Greenville co., S. C.; on the Southern and the Charleston and West Carolina railroads; 153 miles N. W. of Columbia. It is the seat of Furman University, Greenville College for Women, Chicora Female College, Greenville Female College, a military institute, and a business college. It has waterworks, electric lights, daily and weekly newspapers, and 2 National banks. Pop. (1900) 11,860; (1910) 15,741.

Greenwell, Dora, an English author; born in Greenwell Ford, Durham, England, Dec. 6, 1821. After 1848 she lived in Durham. Among her works, all marked by a lofty strain of patience, Christian hope, holy confidence, and deep-seated melancholy, are a volume of poems in 1848, and another in 1861; several short prose works, including "The Patience of Hope," "Two Friends," and a sequel, "Colloquia Crucis" (Talks of the Cross); a Life of Lacordaire (1868), and "Carmina Crucis" (Songs of the Cross) (1869). She died March 29, 1882.

Greenwich (grin'ij), a borough of the city of London, England, on the right bank of the Thames, 6 miles S. E. of London bridge. It contains a magnificent hospital for invalid seamen, built by Sir Christopher Wren (1696). The Royal Observatory, erected by Charles II., is under the charge of the Astronomer Royal, a position that has been filled by Flamsteed, Halley, Bradley, Bliss, Maskelyne, Pond, Airy, etc. The longitude of all English charts and maps is reckoned from this observatory, and the captains of ships take their time as given at 1 P. M.

Greenwood, Grace. See LIPPINCOTT, SARAH JANE (CLARKE).

Greenwood Cemetery, the principal necropolis of New York city and neighborhood, in East Brooklyn, L. I., E. of Gowanus Bay; area 475 acres. It occupies a picturesque site, and is laid out so handsomely as to make it almost without a rival in the world. From its heights the waters of New York Bay may be seen on the one hand, and the broad expanse of the Atlantic on the other. There are 20 miles of roadway and more than 25 miles of footpaths. Its monuments are numerous and costly. The main gateway is adorned with four magnificent sculptures in *alto relievo*, representing four scenes in the resurrection. The number of interments up to 1901 exceeded 300,000.



GREENWICH OBSERVATORY.

Greer, James Augustin, an American naval officer; born in Cincinnati, O., Feb. 28, 1833; joined the navy in 1848; was promoted lieutenant in 1855; was on board the "San Jacinto" when that vessel intercepted the British steamer "Trent," from which Messrs. Mason and Slidell, the Confederate commissioners, were removed. On April 16, 1863, he commanded the ironclad "Benton" in the fleet of Admiral Porter, when that officer forced his way past the Vicksburg batteries; in 1873 he commanded the "Tigress" in the search of the polar seas for the "Polaris," the wreck of

which was found at Littleton Island, North Greenland. Rear-admiral April 3, 1892; retired Feb. 28, 1895; died June 17, 1904.

Greey, Edward (grē), an English-American story-writer; born in Sandwich, Kent, England, Dec. 1, 1835. After spending several years in Japan he came to the United States in 1868, and engaged in commercial pursuits in New York. Among his plays are "Vendome" and "Uncle Abner." His historical works include "Young Americans in Japan" (Boston, 1881), and "The Wonderful City of Tokio." He wrote a pleasing collection of Japanese short stories, "The Golden Lotus," etc. (1883); "The Captive of Love," founded on a Japanese romance; translated "The Loyal Ronins" etc. He died in New York city, Oct. 1, 1888.

Greg, William Rathbone, an English essayist; born in Manchester, England, in 1809. He became a Commissioner of Customs in 1856, and was Controller of the Stationery Office from 1864 to 1877, when he resigned. He was a man of profoundly earnest character, and was interested in many philanthropic measures. He wrote "The Creed of Christendom" (1851); "Essays on Political and Social Science" (1854); "Literary and Social Judgments" (1869); "Political Problems" (1870); "Enigmas of Life" (1872; 18th edition 1891); "Rocks Ahead" (1874), taking a very pessimistic view of the future of England; "Mistaken Aims" (1876); "Miscellaneous Essays" (2d series, 1884). He died in Wimbledon, England, Nov. 15, 1881.

Gregarinida (-rī′ni-dä), or **Gregarina** (-rī′nä), the lowest of the eight classes into which Professor Huxley divides Cuvier's sub-kingdom *Radiata*. He places them in the sub-kingdom *Protozoa*. The species are all microscopic, and consist of a not very well-defined membrane, more or less without structure, except that it contains a soft semi-fluid substance, having in the middle, or at one end of it, a delicate vesicle, inside of which is a more solid particle. Such a structure recalls that of an ovum, the outer membrane of the *Gregarinida* recalling the vitelline membrane of an ovum, the semi-fluid contents its yolk, the vesicle its germinal vesicle, and the more solid particle its germinal spot. There is no division of the body into parts. No mouth or digestive apparatus has been traced; there is, however, an expansion and contraction of the animal. The *Gregarinida* are found parasitic within the bodies of animals, specially the larvæ of insects, in annelids, crustaceans, mollusca, etc., and even in vertebrated animals. They are specially abundant in the alimentary canal of the common cockroach, in earthworms, etc. Various genera are known, and the species are numerous.

Grégoire, Henri (grā-gwär′), the most remarkable among the "constitutional" bishops of France; born in Vého, near Lunéville, France, Dec. 4, 1750. Educated by Jesuits at Nancy, he took orders, and lectured for some time at the Jesuit College of Pont-à-Mousson. Becoming curé of Embermesnil, he was sent to the States General of 1789 as one of the deputies of the clergy. One of the secretaries of the National Assembly, he supported enthusiastically the abolition of the privileges of the nobles and clergy alike, and the civil constitution of the clergy. He was the first of his order to take the oaths, and was elected the first constitutional bishop of the department of Loir-et-Cher, which he accepted, though the old and legitimate bishop, Monseigneur de Thémines, was still alive. At the blasphemous Feast of Reason, the weak Gobel, constitutional Bishop of Paris, publicly renounced Christianity; but Grégoire faced the infuriated rabble with all the courage of the primitive martyrs, and refused to deny his Master. After the 18th Brumaire he became a member of the Corps Législatif. His extreme republicanism was highly distasteful to Bonaparte, and it was only after a third attempt that he was appointed member of the senate. On the conclusion of the concordat between Pius VII. and Bonaparte he ceased to exercise ecclesiastical functions, being unable conscientiously to give the retractations required by the Church. He wrote "Regeneration of the Jews" (1778); "History of Religious Sects" (1814); "Liberties of the Gallican Church" (1818); "Memoirs" (1831). He died in Auteuil, near Paris, May 28, 1831.

Gregorian Calendar, the calendar as reformed by Pope Gregory XIII. in 1582. The Gregorian year is the ordinary year, as reckoned according to the Gregorian calendar.

Gregorian Chant, or **Tones** (Latin *cantus Gregorianus*), the name given to certain choral melodies introduced into the service of the early Christian Church by Pope Gregory the Great, and still forming the basis of cathedral music. By the Gregorian tones, or modes (*toni, modi*) of Gregory, must be understood a certain melodious formula, made out of the union of a perfect fifth and a perfect fourth, or their inversion, to give the Church song greater variety. All the old writers agree as to the diatonic genus of the Gregorian tones, but they do not all agree as to the number of the tones: some counting 14, others 12, while in some old Roman choral books there are only 11.

Gregorian Telescope, the first and most common form of the reflecting telescope, invented by James Gregory in 1663. See GREGORY, JAMES.

Gregorovius, Ferdinand (greg-ō-rō′vē-ös), a German historian and poet; born in Neidenburg, East Prussia, Jan. 19, 1821. He studied at Königsberg and at home, and wrote essays of deep scholarship; "Socialistic Elements in Goethe's Wilhelm Meister"; a tragedy, "The Death of Tiberius"; "Corsica"; books of travel and description, based on close personal study; also "Euphorion," an epic, and other poems of high repute. But his historical works, of unsurpassed learning and vivid realization of the spirit of their times, are the most commanding monument of his genius. "The City of Rome in the Middle Ages," "Lucretia Borgia," "Urban VIII.," "The Monuments of the Popes," and "Athenais," need but be named. He died in Munich, May 1, 1891.

Gregory, Patriarch of Constantinople; born in 1730. He studied at Mount Athos; lived as a hermit; was made archbishop at Smyrna, and, in 1795, Patriarch of Constantinople. In 1798, and again in 1806, he was accused of intriguing for the freedom of Greece, and twice banished to Mount Athos, though each time restored to his post after a short interval. But in 1821, when the Greek insurrection broke out in the Morea, his native country, he became once more an object of suspicion to the Porte, and when, shortly after, he allowed the family of Prince Morousi to escape from his guardianship, he was seized as he left the church on the first day of the Easter festival and hanged in his robes of office before the church gate.

Gregory, the name of a number of popes:

Gregory I., surnamed the Great, a Pope; born in Rome, about 544. He showed such abilities as a senator that the Emperor Justinus appointed him prefect of Rome, after which he embraced the monastic life in a society founded by himself. Pope Pelagius II. sent him as nuncio to Constantinople, and on his return made him apostolical secretary. He was elected successor to that pontiff in 590. Pope Gregory was pious and charitable, had lofty notions of the papal authority, was a reformer of the clerical discipline, and after his death was canonized. His works are comprised in four volumes. He died in 604.

Gregory II., St., succeeded Constantine in the pontificate in 715, and died in 731.

Gregory III., a native of Syria, succeeded Gregory II. He sent legates to Charles Martel to demand succor against the Lombards, which embassy is considered to be the origin of the apostolical nuncios in France. Died in 741.

Gregory IV., a Roman, succeeded Valentine in 828, and was greatly esteemed for his learning and piety. Died in 844.

Gregory V., a German, and a kinsman of the Emperor Otho, succeeded John XV., in 996. An anti-pope, named John XVII., was set up against him by Crescentius, a consul of Rome, but was expelled by the emperor. Died in 999.

Gregory VI., a Roman, succeeded John XIX., who finding the lands and revenues of his church greatly diminished by usurpations, and the roads infested by robbers, acted with such vigor that a powerful party was raised against him by those who had been accustomed to live by plunder. At a council, held at Sutri, in 1046, Gregory abdicated the pontificate. Died in Cologne, about 1048.

Gregory VII., Hildebrand, son of a carpenter; born in Soano, Tuscany, about 1020. He was the friend and counsellor of Leo IX. and the four succeeding Popes, and on the death of Alexander II. was elected to succeed him in 1073. He obtained confirmation in his election from the Emperor Henry IV., and immediately applied himself zealously to reform simony and the licentiousness of the clergy. In his view, however, marriage, no less than concubinage, was a sin in them. He menaced the emperor and the King of France, the latter without effect. In 1074 he assembled a council, by which it was forbidden the prelates to receive investiture of a layman; and this was the first step in the quarrel with the emperor, which lasted so many years. Henry, disregarding the papal authority, was summoned to Rome; but he held a diet at Worms and pronounced the deposition of the Pope. To this Gregory replied by procuring the deposition of the emperor and the election of another, Rudolph of Suabia. Henry now promised submission; and in the early winter of 1077 went with his wife and child to Italy. The Pope was at the castle of Canossa, and there, after keeping the penitent Emperor of Germany three days waiting at the gate, he received him and gave him absolution. The terms imposed on him were intolerable, and he soon broke them, made war on Rudolph, and defeated him, set up a rival Pope in Guibert, Archbishop of Ravenna, with the title of Clement III., and after several unsuccessful attempts entered Rome in 1084, had himself crowned emperor by his own Pope, and besieged Gregory in San Angelo. The Pope was delivered by Guiscard, and retiring to Salerno died there May 25, 1085.

Gregory VIII., born in Benevento, succeeded Urban III., 1187, and died the same year, after having exhorted the Christian princes to undertake a new crusade.

Gregory IX., Ugolino, Count of Segni, a native of Campania, and a near relative of Innocent III.; born about 1147. He became a bishop of Ostia, and cardinal, and in 1227 succeeded Honorius III. His

coronation surpassed in magnificence any which had preceded it, and the ceremony lasted three days. The principal events of his pontificate were the various incidents of his contest with the great Emperor Frederick II., whom he repeatedly excommunicated, absolving his subjects from their allegiance, and proclaiming a crusade against him. In 1229 Gregory levied a tithe on all movables in England toward the expenses of his war with Frederick. He established, a few years later, the inquisition

GREGORY XIII.

at Toulouse and Carcassonne, excited by his haughty demeanor a revolt at Rome in 1234, and was driven from the city, to which he did not return for three years. St. Anthony of Padua, St. Dominic, and St. Elizabeth were canonized by Gregory, who died in Rome, Aug. 21, 1241.

Gregory X., of the illustrious family of Visconti, was elected Pope in 1271, after an interregnum of two years, at which time he was in the Holy Land. He assembled a council at Lyons, to promote a union between the Eastern and Western Churches, and other objects. Died in 1276.

Gregory XI., Peter Roger, a native of Limousin, in France, was a nephew of Clement VI., and son of the Count of Beaufort. He was elevated to the pontificate in 1370, after the death of Urban V., was a patron of learning, and endeavored to reconcile the princes of Christendom and to reform the religious societies. He transferred the papal see from Avignon to Rome, where he died in 1378.

Gregory XII., Angelo Corario, a native of Venice, was raised to the pontificate in 1406, during the schism in the East, Benedict XIII. being the other Pope. Both were deposed by a council held at Pisa, and Alexander V. elected in their stead. Gregory submitted, and laid aside the pontifical dignity. Died in 1417.

Gregory XIII., Buoncompagno, a native of Bologna, and succeeded Pope Pius V. in 1572. He was deeply versed in the canon and civil law, and had distinguished himself at the Council of Trent. He ornamented Rome with many fine buildings and fountains; but his pontificate is chiefly memorable for the reformation of the calendar which took place under his auspices and bore his name (see Gregorian Calendar). Died in 1585.

Gregory XIV., Nicholas Sfondrate, succeeded Urban VII. in 1550. He was the son of a senator of Milan, and involved himself in an unsuccessful war against Henry IV. of France. Died in 1591.

Gregory XV., Alessandro Ludovico, was a native of Bologna, and descended from an ancient family. He succeeded Paul V. in 1621, and was the founder of the College of the Propaganda. It was this Pope who, in 1622, canonized Ignatius Loyola, Francis Xavier, and Philip de Neri. He was author of several works, one of which is entitled "Letter to the King of the Persians," etc. (1627). He died in 1623.

Gregory XVI., Mauro Capellari, born in Belluno in 1765, and succeeded Pius VIII., 1831. His pontificate was a period of no ordinary interest and difficulty in the history of the Church, and in the relations of the Vatican with the temporal powers of Christendom. Simple in his habits, though narrow in his ideas and timid in his manners, he nevertheless displayed great energy in conducting the affairs of the Church. He

GREGORY XV.

died in 1846 and was succeeded by Pius IX.

Gregory, James, a Scottish mathematician; born near Aberdeen, Scotland, in 1638. He studied at Marischal College. Before completing his 24th year he invented the Gregorian Telescope (*q. v.*). In 1665 he went to the University of Padua, where in 1667 he produced "The True Quadratures of the Circle and Hyperbola," followed in 1668 by "Universal Geometry" and "Exercises in Geometry." Shortly af-

ter his return home he obtained (1669) the professorship of mathematics at St. Andrews, a chair which he filled till his removal to a similar one at Edinburgh in 1674. To him is also attributed a satirical tract, "Great and New Art of Weighing Vanity" (1672). He died in Edinburgh, Scotland, in October, 1675.

Gregory, John Milton, an American educator; born in Sand Lake, N. Y., July 16, 1822; was graduated at Union College in 1846; later entered the Baptist ministry, but soon gave up preaching for teaching. He was State superintendent of public instruction in Michigan in 1858–1863; president of Kalamazoo College in 1863–1867; and president of the Industrial University in Champaign, Ill., in 1867–1880. His publications include "Compend of the School Laws of Michigan"; "Handbook of History" (1866); 'A New Political Economy" (1882); "Seven Laws of Teaching" (1883); etc. He died in Washington, D. C., Oct. 20, 1898.

Gregory, St., surnamed Illuminator, the founder of the Armenian Church; born in Valarshabad, Armenia, about 257. He was of the royal Parthian race of the Arsacidæ, and son of Anak, murderer of Chosrov I., King of Armenia. For this crime his whole family was slain save himself. He owed his escape to a Christian nurse, who secretly conveyed him, when he was 2 years old, to Cæsarea, in Cappadocia, her native town. He there married a Christian who bore him two sons and soon afterward became a nun. Gregory proceeded to Rome, and entered the service of Terdat, Chosrov's son. After Terdat (Tiridates III.) had, with the help of the Romans, recovered his father's kingdom (286), Gregory, for his refusal to crown with garlands the statue of Anahit, tutelary goddess of Armenia, was thrown by Terdat into a deep pit, where a pious widow nourished him for 14 years. About the end of that time Terdat was visited with the punishment of Nebuchadnezzar. Healed and baptized by Gregory, he became a zealous Christian, and established Christianity by force throughout his dominions. Gregory was consecrated bishop and head of the Armenian Church by Leontius, Archbishop of Cæsarea. Having resigned the patriarchate in favor of his second son Aristaces, Gregory in 331 retired to a cave at the foot of Mount Sebuh in Upper Armenia, where he died in 332.

Gregory Nazianzen, St., a father of the Church, Bishop of Constantinople; born near Nazianzus, Cappadocia, in 326. His father, a convert from heathenism, was bishop of Nazianzus. He received an excellent education, which he improved at Athens, where he formed an acquaintance with St. Basil. On his return home he was ordained; hesitated long between the contemplative and the active life; adhered to the Nicene doctrine, and endeavored to keep together its persecuted adherents; assisted his father in his pastoral duties, and at length became minister to a small congregation of the Nicene Christians at Constantinople. Distinguishing himself greatly by his fervent eloquence, and no less by his wisdom and moderation, he was made bishop of Constantinople by Theodosius in 380. He excelled all his contemporaries in pulpit eloquence. Many of his works are extant, and consist of orations, letters, and poems. After filling his high and difficult post for one year, he resigned and returned to his native place, where he died in 389.

Gregory of Nyssa, St., the younger brother of St. Basil; ordained Bishop of Nyssa in 372. The zeal he displayed against the Arians excited the resentment of the Emperor Valens, who belonged to that sect, and he was banished; but on the accession of Gratian he was restored to his see. He was present at the council of Constantinople in 381, and at another in 394, and died soon afterward.

Gregory of Tours, a Frankish historian; born in Arverna (now Clermont), Auvergne, France, about 540. He belonged to one of the most distinguished Roman families of Gaul. Originally called Georgius Florentius, he assumed the name Gregory out of respect for his mother's grandfather, Gregory, Bishop of Langres. He was educated by his uncle, Gallus, Bishop of Clermont, and after his death by Avitus, a priest of his native town. His recovery from a severe sickness, through a pilgrimage to the grave of St. Martin of Tours, led Gregory to devote himself to the service of the Church, and by the choice of the clergy and people and favor of Sigbert, King of Austrasia, to whom Auvergne had fallen on the death of Clothar I. in 561, he became Bishop of Tours in 573. He gave himself zealously to his sacred office and the public good. In the struggles between Sigbert and his wife Brunhilda on the one side against Chilperic and his wife Fredegonde on the other he took the side of the former, and in the vicissitudes of a conflict in which Tours frequently changed masters had to suffer many persecutions. After the death of Chilperic he enjoyed great influence over his successors, Guntram and Childebert II. His fame rests on his "History, or Annals," the chief authority for the history of Gaul in the 6th century. He died in Tours, France, Nov. 17, 594.

Gregory Thaumaturgus (thâ-ma-ter′-gus) ("wonder-worker"), a celebrated disciple of Origen, and the apostle of the Christian Church in Pontus; born of

wealthy heathen parents in Neocæsarea, Pontus, about 210. He was originally named Theodorus. His early education was for the practice of law, but coming under the influence of Origen at Cæsarea in Palestine, he was his disciple for about eight years, with an interruption caused by the persecution under Maximin the Thracian, during which he probably studied at Alexandria. He produced his "Panegyric" on Origen, and returning to his native country was consecrated Bishop of Neocæsarea by Phædimus, Bishop of Amasea. The influence of Gregory in Asia Minor continued from the middle of the 3d century to far down into the 4th, and its extent may be inferred from the numerous legends of his miracles, and the tradition that at his death there were only as many pagans in Neocæsarea as there had been Christians in it at his consecration — viz., 17. His celebrated "Ekthesis," or "Confession of Faith," is of the greatest value as a record of the state of the theology at the middle of the 3d century. Gregory is said to have contended against Sabellianism. He died about 270.

Greif, Martin (grīf) (an adopted name), a German dramatist, son of Max Frey, the publicist; born in Speyer, June 18, 1839. Designed for public life, he preferred the literary career. "Hans Sachs," a successful drama, was followed by a volume of poems, the tragedies "Corfiz Ulfeldt, the Count Chancellor of Denmark," "Marino Faliero," the light comedy "Walter's Return to his Country," and numerous other works of high literary qualities and scholarship. Strikingly successful plays also are "Francesca da Rimini," and "Agnes Bernauer, the Angel of Augsburg." He is also a noted lyric poet.

Greifswald (grīfs'vält), a town of Prussia, in the province of Pomerania; 2½ miles from the mouth of the Ryck and 25 miles S. E. of Stralsund. The university (founded in 1456) had, in 1900, 95 professors and teachers, and 834 students, and was well equipped with medical museums, laboratories, etc.; the library contained about 135,000 volumes. There is a considerable shipping trade. The chief industries include the making of machinery, chains, and railway wagons, the curing of herrings, and iron-founding. Shortly after being made a town (1250) Greifswald joined the Hanseatic League. At the peace of Westphalia (1648) it came into the possession of Sweden; but together with the whole of Swedish Pomerania was ceded to Prussia in 1815. Pop. (1905) 23,763.

Grein, J. T. (grin), an Anglo-Dutch journalist; born in Amsterdam, Oct. 11, 1862. He was educated in Holland, Germany, and Belgium, and from 1879 to 1885 was engaged in the East India trade and banking. He then became an attorney in London, besides being dramatic critic of "Life" and the "Westminster Review," London editor of three papers in Holland, and correspondent of several French and German journals. In 1891 he founded the Independent Theater Society. Besides "A Man's Love," produced in 1889 with C. W. Jarvis as coauthor, and other plays, his works include (in Dutch): "Dramatic Essays" (1884); "Silhouettes" (short novels), published in 1885; "London: Wealth and Poverty" (1890); "'Twixt Light and Dark," short stories.

Greisen (grī'zen), a rock composed essentially of quartz and mica, but which almost invariably contains topaz. It is met with in regions where tin ores abound, and is believed to be a granite which has been metamorphosed in connection with exhalations of fluoric acid.

Greiz (grīts), a capital of the German principality of Reuss-Greiz and seat of the sovereign prince; on the White Elster, 47 miles S. S. W. of Leipsic. It contains three castles and a 13th-century church, and manufactures cotton and woolen goods, also cashmere and shawls, and possesses dyeworks and linen-printing establishments. The town was severely ravaged by fire in 1494, and again in 1802. Pop. (1905) 23,114.

Gremial, an episcopal ornament for the breast, lap, and shoulders, originally a towel of fine linen, used in ordination to protect the sacred vestments from any drops of unction that might fall in the act of anointing the candidates for the priesthood; in later times it was made of silk or damask to match the episcopal vestments.

Grenada (gre-nā'dä), an island of volcanic origin in the British West Indies, lying N. by W. from Trinidad; area, 133 square miles; pop. (1906) 69,530. Some of the craters in the central ridge of mountains, rising to 3,000 feet, have been transformed into large lakes; streams and mineral springs abound; there are several good natural harbors. The inhabitants, who are almost all negroes, cultivate cocoa, coffee, and oranges; a little rum is manufactured, and spices and fruits are grown. The exports in 1898 amounted to £257,274; the imports to £210,783. Capital and headquarters of the government of the Windward Islands, St. George's. Grenada has been a crown colony since 1885; previous to that date it had a constitutional government. Columbus was the discoverer of the island in 1498.

Grenelle (gre-nel'), an ancient burg between Paris and Auteuil, subsequently a

faubourg of Paris, and now an integral part of the city. Grenelle is particularly noted for its celebrated artesian well, 1,704 feet deep, which supplies all the upper portion of Paris with water.

Grenfell, George, an English missionary; born in Cornwall, in 1849; went to Africa for the Baptist Kongo missions, and his name will always be associated with the exploration of many of the Kongo tributaries. The geographical societies of England, France, and Germany sought for and published contributions from him, and, next to Livingstone and Krapf, he ranks among the foremost of Africa's missionary travelers. He died July 1, 1906. See Sir Harry Johnston's "George Grenfell and the Congo" (New York, 1910).

Grénier, Edouard (grān-yā′), a French poet; born in Baumes-les-Dames, Doubs, France, in 1819. He abandoned the diplomatic service for poetry. "Little Poems" was his maiden collection; "The Death of the Wandering Jew" attained repute for delicacy and suggestiveness, and "Dramatic Poems" for intense power. His lines on "The Death of President Lincoln" were crowned by the Academy.

Grenoble, (gre-nō′bl), a fortified town of France; capital of the department of Isère, on the Isère, 60 miles S. E. of Lyons. Grenoble occupies both sides of the river, which is crossed by three bridges and lined by fine quays. It has a cathedral, and a more noteworthy church (Saint-André), with the tomb of Bayard; a public library of 170,000 volumes and 7,500 MSS.; a college, museum, bishop's palace, court house, arsenal, and extensive public gardens. The manufactures consist of gloves, which may be considered the staple, linen and hemp goods, liquors, leather, etc. Grenoble existed in the time of Cæsar; and Gratian, who had improved it, changed its name from Cularo to Gratianopolis. Pop. (1906) 73,-022.

Grenville, George, an English statesman; born Oct. 14, 1712; was younger brother of Richard Grenville, Earl Temple, and brother-in-law of the Earl of Chatham. He entered Parliament in 1741, and from 1744 to 1762 filled several government offices. In 1757 he introduced a bill for the regulation of the payment of the navy. In 1762 he became Secretary of State, and then First Lord of the Admiralty; and in the following year he succeeded Lord Bute as prime minister, uniting in himself the offices of Chancellor of the Exchequer and First Lord of the Treasury. The most prominent facts of his administration were the prosecution of Wilkes and the passing of the American Stamp Act, which first drove the American colonies to resistance. He resigned the premiership in 1765, and died in London, England, Nov. 13, 1770.

Grenville, Sir Richard, an English naval officer; born about 1541; cousin of Sir Walter Raleigh. In 1585 he was given command of a fleet of seven vessels to aid in the colonization of Virginia. His most brilliant exploit occurred in 1591, when he attempted to cut his way through a Spanish fleet of 53 ships. His ship was becalmed and attacked by 15 of the largest Spanish vessels. Not till after 15 hours of battle and when only 20 out of his 150 men were left alive did he strike his colors. He died in September, 1591, from wounds received in the engagement.

Grenville, William Wyndham, Lord Grenville, an English statesman, third son of George Grenville; born Oct. 25, 1759. After studying at Eton and Oxford, he became in 1782 a member of the House of Commons and secretary to his eldest brother, Earl Temple (afterward Marquis of Buckingham), just appointed lord-lieutenant of Ireland. Soon after he became paymaster-general of the army, and in 1789 was chosen Speaker of the House of Commons. But in 1790, on his appointment as Secretary of State for the Home Department, he was raised to the peerage with the title of Baron Grenville. He became Foreign Secretary in the ensuing year. He resigned office, along with Pitt, in 1801, on the refusal of George III. to give his assent to the Catholic Emancipation Bill. In 1806 he formed the government of "All the Talents," which, before its dissolution in the following year, passed the act for the abolition of the slave trade. From 1809 to 1815 he acted with Earl Grey, and generally supported Canning. Lord Grenville was an able speaker and an excellent scholar. He died at Dropmore, Buckinghamshire, England, Jan. 12, 1834.

Grenville-Murray, Eustace Clare, an English descriptive writer; born in 1824. He experimented unsuccessfully in fiction, and then won reputation with "French Pictures in English Chalks," a series of humorous sketches; "History of the French Press" (1874); "Round about France" (1878); and "Side Lights on English Society" (3d ed. 1889). "The Member for Paris" (1871) had some vogue. He died Dec. 20, 1881.

Gresham, Sir Thomas, an English financier; born in 1519; only son of Sir Richard Gresham. Apprenticed to his uncle, Sir John Gresham, a wealthy London mercer, and then sent to study at Gonville Hall, Cambridge, in 1543 he was admitted a member of the Mercers' Company, and in 1551 was employed as "king's merchant" at Antwerp. In two years he paid off a heavy loan, entirely restored the king's credit, and

introduced a new system of finance. As a Protestant he got his dismissal from Queen Mary, but on presenting a memorial of his past services was soon reinstated. By Queen Elizabeth he was in 1559 knighted and appointed for a short time English ambassador at the court of the regent at Brussels. The troubles in the Netherlands compelled him, in 1567, to withdraw finally from Antwerp. In 1569, by his advice, the State was induced to borrow money from London merchants instead of from other foreigners, to the great advantage of the mercantile body. Having in 1564 lost his only son, Richard, in 1566–1571 he devoted a portion of his great wealth to the erection of an Exchange in imitation of that of Antwerp, for the London merchants, who were wont to meet in the open air. Renowned for his hospitality and liberality, he frequently entertained foreign personages of distinction, and erected a magnificent mansion at Osterly Park, near Brentford, where he was visited by Queen Elizabeth. For the endowment of a college in London he directed by his will that his town mansion in Bishopsgate street should be converted into a residence and lecture rooms for seven professors, to be salaried out of the royal exchange revenues. He also provided for the erection and support of eight almshouses, and made many other charitable bequests. He died in London, England, Nov. 21, 1579.

Gresham, Walter Quinton, an American jurist; born near Lanesville, Harrison co., Ind., March 17, 1832. He became a member of the Indiana State Legislature in 1861; served in the Civil War, rising to Brigadier-General of volunteers; at its close resumed the practice of law, and in 1869 was appointed by President Grant United States District Judge for Indiana; in 1883 was appointed Postmaster-General by President Arthur; in 1884 became Secretary of the Treasury, and later was appointed one of the judges of the United States Circuit Court. He died in Washington, D. C., May 28, 1895.

Gresset, Jean Baptiste Louis de (gressā), a French satirist; born in Amiens, France, Aug. 29, 1709. Early a Jesuit and teacher, he gained some repute from a pleasing ode "On the Love of One's Native Land"; and rose to fame by "Vert-Vert," a highly original and deliciously humorous verse narrative of a parrot brought up in a nunnery but falling into evil society. His tendency to burlesque and irreverence in his poetry caused his expulsion from the order on the appearance of "The Improvised Carnival" and "The Living Reading-Desk." He cared nothing for this, and shortly after rose to the pinnacle of popularity through "The Naughty Man." He entered the Academy in 1748, and wrote much popular prose and poetry; but later in life became alarmed concerning his soul, and abjured all his writings. He died in Amiens June 16, 1777.

Gretna Green, a village in Dumfriesshire, Scotland; near the head of the Solway Firth; 10 miles N. N. W. of Carlisle. After the abolition of Fleet marriages by Lord Hardwicke's Act (1754), English persons wishing to marry clandestinely had to get out of England, to which alone that act had reference. Thus the practice arose of crossing the border into Scotland, where Gretna Green, or Springfield, as the first village, had by 1771 become, in Pannant's words, "the resort of all amorous couples whose union the prudence of parents or guardians prohibits." At the toll house nearly 200 couples were sometimes united in a year. One of the earliest Scottish runaway matches on record is Richard Lovell Edgeworth's (1763); among his successors were Lords Brougham, Dundonald, Eldon, and Erskine, besides numerous scions of the noble families of Villiers, Fane, Beauclerc, Coventry, Paget, etc. In 1856 all irregular marriages were rendered invalid unless one of the parties had been residing in Scotland for three weeks previously; this proviso observed, a Gretna Green marriage is still possible.

Gretna Green of Ireland, Port Patrick, a seaport town of Scotland, the nearest port to Ireland; runaway couples from the Emerald Isle bent on matrimony used frequently to fly thither.

Grétry, André Ernest Modeste (grātrē'), a French composer; born in Liège, France, Feb. 8, 1741. He studied at Rome, and settled at Paris, where he became famous as the author of more than 40 comic operas, of which "The Huron" (1768) and "Lucile" (1769) were the earliest, and "Raoul" and "Richard the Lion-Hearted" among the best known. He was made inspector of the Conservatoire, and a member of the Institute; later a pension from Napoleon enabled him to retire to Ermenonville, where he died Sept. 24, 1813.

Greville, Charles Cavendish Fulke, an English writer; born April 2, 1794; was educated at Eton and at Christ Church, Oxford. Before he was 20 he was appointed private secretary to Earl Bathurst. In 1821 he became clerk of the Council in Ordinary, an office which he held till 1860. He wrote: "Past and Present Policy of England toward Ireland" (1845); "Memoirs" (1875–1887). He died in London Jan. 18, 1865.

Gréville, Henry (grā-vēl'), pseudonym of Madame Alice Durand (*née* Fleury), a French novelist; born in Paris, France, Oct. 12, 1842. She accompanied her father when he was called to a chair at St. Petersburg

in 1857, and there married Émile Durand, a French professor of law, with whom she returned to France in 1872. Already at St. Petersburg she had contributed romances to the journals; when at Paris she began to issue with great rapidity a series of novels, often bright, vigorous, and original in their pictures of Russian society. "Dosia" (1876) received from the Academy the Montyon prize, and was followed by "The Princess Ogheroff" (1876); "The Koumiassines" (1877); "The Friend" (1878); "A Russian Violin" (1879); "Lost" (1881); "Rose Rozier" (1882); "A Crime" (1884); "Idyls" (1885); "Cleopatra" (1886), etc. She died May 26, 1902.

Grévy, François Paul Jules (grā-vē'), a French statesman; born in Mont-sous-Vaudry, in the Jura, France, Aug. 15, 1813. He attended school and college near his native place. When not yet 20 he began to study law in Paris, and becoming interested in politics, took part in the revolution of 1830, which drove Charles X. from the French throne. Possessing fine oratorical talents, he applied them to the defense of such radical republicans as were brought to trial for their share in this political outbreak. In this way he gained a reputation as an able republican orator, and when, in 1848, Louis Philippe was dethroned, and a republican government set up, Grévy became prominent. He was deputy to the Constituent Assembly in 1848, where he took a prominent part in the organization of the government. Being opposed to Louis Napoleon he was obliged to keep out of public affairs from 1852 to 1869, devoting these years to his profession. In 1869 the Jura again sent him to the national legislature. Napoleon's downfall revived republican activity. Grévy was chosen president of the National Assembly which met in 1871. In 1873, when the young republic seemed to be headed toward another monarchy, he advocated democracy as the only hope of France. In 1876, 1877, and 1879 he again represented the Jura in the French Parliament, and in the latter year he was chosen president of the republic by an enormous majority. In 1886 he was reëlected, but on account of a scandal in which his son-in-law was implicated was forced to resign Dec. 2, 1887. He died in Mont-sous-Vaudry, Sept. 9, 1891.

Grey, Charles, 2d Earl, an English statesman; born in Falloden, near Alnwick, Northumberland, England, March 13, 1764. He became in 1786 a member of Parliament, and in 1792 was one of the founders and most active members of the "Society of the Friends of the People." In 1797 he brought forward a motion for parliamentary reform, for which he continued to labor strenuously, though he was for many years unsuccessful in carrying the object of his wishes. When Lord Grenville, in 1806, came into office, Grey, as Lord Howick, became First Lord of the Admiralty, and, as one of the leaders of the House of Commons, carried the act for the abolition of the slave trade. In the following year the cabinet was broken up, and he, in the same year, succeeded to the title by the death of his father. In the House of Lords he became one of the leaders of the opposition. For many years he remained out of office; but in 1830 he was called on by William IV. to form a new cabinet. He accordingly became prime minister, and announced "peace, retrenchment, and reform" as the objects of his policy. In 1831 the Reform Bill was introduced by Lord John Russell into the House of Commons; but in the following year the ministers resigned, on account of a motion of Lord Lyndhurst. They were restored to power, however, and in the same year the bill was passed. In the succeeding year Earl Grey resigned, and, after about two years, retired from public life. He died July 7, 1845.

Grey, Henry, 3d Earl, an English statesman, son of Charles Grey; born Dec. 28, 1802. He was educated at Trinity College, Cambridge, and in 1826, as Lord Howick, was returned to the House of Commons for Winchelsea. He next sat for a brief period for Higham Ferrers, and after the passing of the Reform Bill of 1832 was elected for North Northumberland. He was appointed Under-Secretary for the Colonies in his father's ministry, but retired in 1833 because the cabinet would not support the immediate emancipation of the slaves. He subsequently held for a short time the post of Under-Secretary in the Home Department, and in Melbourne's administration of 1835 became Secretary for War. In 1841 he was rejected for Northumberland, but returned for Sunderland, and now opposed Peel's policy. He succeeded his father in the peerage in 1845, and in the following year entered Lord John Russell's cabinet as Secretary for the Colonies. After the resignation of the government in 1852, he published "Defense of the Colonial Policy of Lord Russell's Administration." He now took his seat on the cross-benches, and never afterward held office. In 1858 he issued his "Essay on Parliamentary Government as to Reform"; in 1867 he published his father's "Correspondence with William IV." He died Oct. 9, 1894.

Grey, Sir George, an English statesman, nephew of the great reform leader, Earl Grey; born in Gibraltar, May 11, 1799; was educated at Oriel College, Oxford; called to the bar at Lincoln's Inn in 1826, but relinquished the law after succeeding to the baronetcy in 1828. In 1832 he was returned

to the House of Commons for Devonport, which he continued to represent for 15 years. He was Under-Secretary for the Colonies in 1834–1839; judge-advocate-general, 1839–1841; home secretary under Lord John Russell, 1846–1852. During the time of the Chartist disturbances he discharged the difficult duties of his office with vigor and discrimination, this being the culminating point of his career. He was colonial secretary in 1854–1855; and home secretary again in 1855–1858 and 1862–1866. He died in Falloden, near Alnwick, Sept. 9, 1882.

Grey, Sir George Edward, a British colonial governor; born in Lisburn, Ireland, April 14, 1812. He was educated at the Royal Military College at Sandhurst. In 1837 he undertook the exploration of the interior of Australia. In September, 1838, he organized another expedition to explore the Swan river district. He returned to England in 1840, and published "Journals of Two Expeditions in Northwestern and Western Australia." He was governor of South Australia in 1841–1846; of New Zealand in 1846–1854; of Cape Colony in 1854–1861; of New Zealand in 1861–1867; superintendent of Auckland in 1875; premier of New Zealand in 1877–1884. He published "Journals of Discovery in Australia" (1841); "Polynesian Mythology" (1855); and "Proverbial Sayings of the Ancestors of the New Zealand Race" (1858). He died in London, Sept. 19, 1898.

Grey, Lady Jane, a Queen of England, whose disastrous fate, as the victim of an unprincipled relative's ambitious projects, has created an extraordinary interest in her favor. She was the daughter of Henry Grey, Marquis of Dorset, afterward Duke of Suffolk, by the Lady Frances, daughter of Charles Brandon, Duke of Suffolk, and Mary, younger sister of Henry VIII., in whose reign Lady Jane was born, according to the common account, in 1537. She displayed much precocity of talent, and to the usual accomplishments of females she added an acquaintance with the learned languages, as well as French and Italian. Roger Ascham has related that on making a visit to Bradgate Hall he found Lady Jane, then a girl of 14, engaged in perusing Plato's "Dialogue on the Immortality of the Soul" in the original Greek, while the rest of the family were hunting in the park. She owed her early proficiency in literature in some measure to her learned tutor, Aylmer, afterward Bishop of London; and from him she imbibed a lasting attachment to Protestantism.

The Oriental as well as the classical languages are said to have been familiar to her, and she is represented as having been altogether a young person of uncommon genius and acquirements. But the latter are less singular than might be supposed by those who do not take into account the general taste for the cultivation of Greek and Roman lore which prevailed among both sexes for some time after the revival of literature in Europe. Lady Jane Grey was a woman of talents, but not a prodigy; and Mrs. Roper, the interesting daughter of Sir Thomas More, with Lady Burleigh and her learned sisters, may be adduced as not inferior to her in learned accomplishments. The literary accomplishments of this unfortunate lady, however, do less honor to her memory than the spirit with which she bore the annihilation of her prospects of sovereignty, and the disgrace and ruin of the dearest object of her affections. The tale of her elevation and catastrophe has been often related.

The most material circumstances are her marriage with Lord Guildford Dudley, fourth son of the Duke of Northumberland, in May, 1553; which, though it originated in the ambitious projects of her father-in-law, was a union of affection. Edward VI. was induced on his deathbed to settle on her the succession to the crown. He died on July 5, 1553. The council endeavored to keep his death a secret, with a view to secure the persons of the Princesses, Mary and Elizabeth. Mary was apprised of their design, and wrote them expressing her surprise that she had not been advised of her brother's death, and commanding them on their allegiance to proclaim her title. The council replied exhorting her to be quiet and obedient and proclaimed Lady Jane on the 10th. On the approach of Mary the council, who were unsupported in their usurpation, meanly deserted their victim Lady Jane, and joined in proclaiming Mary queen on the 19th, and on the 20th Lady Jane was confined to the Tower. On Nov. 13 she and her husband were arraigned and pleaded guilty of high treason; but their doom was suspended, and they might, perhaps, have been allowed to expiate their imprudence by a temporary confinement but for the ill-advised insurrection under Sir Thomas Wyatt, in which the Duke of Suffolk, Lady Jane's father, was weak enough to participate. The suppression of this rebellion was followed by the execution of Lady Jane Grey and her husband. Lady Jane resolutely defended her opinions against the arguments of the Roman divines sent to reason with her, and prepared herself with firmness for her approaching fate. She was beheaded on Tower Hill, Feb. 12, 1554, her husband having previously suffered the same fate. A book entitled "The Precious Remains of Lady Jane Gray," was published after her execution.

Greys, a regiment of cavalry in the British army, originally Scottish, and so called from the horses being all of a gray color; they are also called the Scots Greys.

Greytown (also SAN JUAN DE NICARAGUA and SAN JUAN DEL NORTE), principal seaport of Nicaragua; on the Caribbean Sea, at the mouth of the San Juan river; has an excellent natural harbor, protected by a costly breakwater, but much silted up; considerable export trade in hides, rubber, bananas, and mahogany; and communication with the Pacific coast by steamers on the river and Lake Nicaragua and by rail from Grenada to Corinto. Pop. about 2,500.

Greywacke, Graywacke (-wak'e), or **Grauwacke** (grâ-), the popular name used by German miners to designate a particular kind of sandstone, usually an aggregate of small fragments of quartz, flinty slate, or Lydian stone and clay-slate cemented by argillaceous matter. In geology, the older Palæozoic strata. As, however, rocks of the petrological aspect called Grauwacke occur in the Old Red Sandstone, in the millstone grit of Carboniferous age, in the Cretaceous rocks, and in the Eocene, the term is not a good one to distinguish any single geological period; it has, therefore, been exchanged for Silurian.

Greywethers, the name given to large blocks of hard sandstone, which are scattered sporadically over the S. and S. E. parts of England. The name has probably been suggested by their resemblance in the landscape to sheep lying about. Other names by which they are known are Sarsden Stones, Druid Stones. They are believed to be the relics of beds of the Eocene age. The outer ring of monoliths at Stonehenge is formed of greywethers.

Gribble, *Limnoria terebrans,* an isopod crustacean, section *Cymothoada.* It is above two lines in length; it rolls itself up like a woodlouse, and attacks the timber of ships, to which it is most destructive.

Gridiron Pendulum, in horology, a compensation pendulum in which the bob is supported by parallel bars of two metals which are unequally expanded by heat. These are so disposed that, while one tends to lengthen it, the other tends to shorten it. The ratio of lengths is determined by the relative expansibility.

Gridiron Valve, in a steam engine, a valve whose opening is divided into a number of narrow parts by which the travel may be abridged, and the more rapid opening or closing of the valve effected.

Gribojedov, Alexander Sergeievich (grē-bō-yā'dov), a Russian dramatic poet and statesman; born in Moscow, Jan. 15, 1793. As a writer his reputation rests mainly on "Knowledge Brings Suffering," a drama in verse, delineating Russian society with bitter fidelity. "A Georgian Night" and a rendering of the prelude to "Faust" are also creditable productions. A distinguished soldier and diplomat, he was assassinated while minister to Persia, during an anti-Russian tumult in Teheran, Feb. 11, 1829.

Gridley, Charles Vernon, an American naval officer; born in Logansport, Ind., in 1845; entered the United States navy in September, 1860; was promoted midshipman July 16, 1862; commander, March 4, 1868; and captain, March 12, 1868; and shortly after was ordered to the Pacific station. When he reached Hong Kong, China, he was placed in command of the cruiser "Olympia," the flagship of the Asiatic fleet. On the morning of May 1, 1898, after the American fleet entered Manila Bay, Captain Gridley took his position in the conning tower of the "Olympia" and Commodore Dewey stood on the bridge. As soon as the American ships drew within range of the Spanish fleet Commodore Dewey gave the brief command: "You may fire when you are ready, Mr. Gridley," and in a few minutes the battle began. Captain Gridley skillfully managed the "Olympia" during the engagement and delivered the broadside which destroyed the flagship of the Spanish fleet. Though very ill, he commanded his ship throughout the fight. Shortly after his sickness became more serious, and he was ordered home, but died on reaching Kobe, Japan, June 4, 1898.

Grieben, Hermann (grē'ben), a German poet and journalist; born in Köslin, Feb. 8, 1822. He studied in Breslau and rose to prominence in journalism, editing the "East Sea Journal," the "Cologne Journal," and other equally important sheets. He wrote "Too Late," a tragedy, under the pseudonym of "Roderick," and a valuable volume on Dante; besides poems in three collected editions, including "Voices of the Time." He died in Cologne, Sept. 24, 1890.

Grieg, Edvard (grēg), a Scandinavian composer; born in Bergen, Norway, June 15, 1843; entered the conservatory at Leipsic in 1858, where he remained for four years; then continued his studies at Copenhagen. He went to London in 1888, where he both played and conducted. Among his compositions are "Humoresken" (for the piano); "Songs"; the "Peer Gynt" suite; "Norwegian Folk-Songs"; "Ligurd Jorsalfa" (an opera); "Norwegian Dances"; etc. He died Sept. 4, 1907.

Griepenkerl, Wolfgang Robert (grēp'-en-kārl), a German poet, dramatist, and essayist; born in Hofwyl, Bern, Switzerland, May 4, 1810. He became a tutor and professor of literature soon after the completion of his university course. His

"Pictures from Classic Greece," a collection of poems, attracted attention, and an epic on "The Sistine Madonna" made him celebrated. He wrote several excellent works on music. "Artistic Genius in German Literature During the Last Century" was for years an authority on the subject. As a playwright, "Maximilian Robespierre" and "The Girondins" entitle him to no minor place, and his "Ideal and World" and "In the Upper Sphere" have been staged many times. He wrote a volume of stories that possess merit. He died in Brunswick, Oct. 16, 1868.

Grierson, Benjamin Henry, an American military officer; born in Pittsburg, Pa., July 8, 1826. When the Civil War broke out he joined the Union army and became a distinguished cavalry officer. In April, 1863, he successfully led a cavalry raid from La Grange to Baton Rouge, making much easier the operations of Grant against Vicksburg; was promoted colonel of the 10th United States Cavalry in 1866, and brevetted Major-General, U. S. A., in March, 1867. In 1890 he was promoted Brigadier-General, U. S. A., and retired.

Griesbach, Johann Jakob (grēs'bäch), a German Biblical scholar, author of the first critical edition of the New Testament; born in Butzbach, Hesse-Darmstadt, Jan. 4, 1745. He studied theology at Tübingen, Halle, and Leipsic. He commenced lecturing as privat docent in Halle, and in 1773 was made extraordinary professor; but in 1776 he was called as ordinary professor to Jena. The great work with which his name is associated is his critical revision of the New Testament text. Among his notable works are: "Synopsis of the Evangelists" (1774–1775) his edition of the whole New Testament (1775); "Popular Dogmatics" (1779); "Critical Commentary on the New Testament Text" (1798–1811); and "Minor Academical Works" (1825). He died in Jena, March 24, 1812.

Griesinger, Karl Theodor (grē'zing-er), a German novelist; born in Kirnbach, in the Black Forest, Dec. 11, 1809; studied theology at Tübingen and became a clergyman, then drifted into authorship. His first hit was made with "Silhouettes from Suabia"; and he founded the "Suabian Humorist," only to meet ruin by the upheavals of 1848. After another attempt to establish a popular paper, and an ensuing term of imprisonment, he visited the United States. "Living Pictures from America"; "Emigrant Stories"; "The Old Brewery, or New York Mysteries of Crime"; and "Vatican Mysteries" were written on his return home. He died in Stuttgart, March 2, 1884.

Griff, in weaving, a series of horizontal parallel-edged bars, also known as knives or blades, arranged in a reciprocating frame to raise and lower the vertical hooked rods connected to the shedding mechanism, when the hooked ends of the rods are brought by a pattern device within the path of the knives.

Griffon, or **Griffin,** in mythology, a fabulous animal, usually represented with the body and legs of a lion, and the head and wings of an eagle, signifying the union of strength and agility. Figures of griffons are frequently used as ornaments in works of art. It is employed as an emblem of vigilance, the animals being supposed to be the guardians of mines and hidden treasures. Figures of it are met with in tombs and sepulchral lamps, as guarding the remains of the deceased. In ornithology, the bearded vulture, *Gypaetus barbatus,* a predatory bird, gray or blackish-brown above, the tips of the shafts white, the lower parts orange yellow, the head and neck whitish. Length 4½ feet, the expansion of the wings between 9 and 10 feet. It is found in the Alps, where it feeds chiefly on young chamois, and in some parts of Southern and Central Europe, as well as in Asia and Africa. It feeds on birds, small mammals, lambs, etc., and children also have been carried off by it. When pressed by hunger it will devour putrescent meat. It is said to pursue animals till it makes them fall over precipices. Called also the lammergeyer.

Griffin, Appleton Prentiss Clark, an American author; born in Wilton, N. H.; received a public school education; was connected with the Boston Public Library in 1871–1894; became assistant librarian in the Congressional Library in 1897. His publications include "Discovery of the Mississippi"; "Index of Articles Upon American Local History in Collections"; etc.

Griffin, Gerald, an Irish novelist, dramatist, and poet; born in Limerick, Ireland, Dec. 12, 1803. In 1823 he went to London and embarked on a literary career. His first success in fiction was "Holland Tide; or Munster Popular Tales" (1827), a series of short stories. "Tales of the Munster Festivals" (1827) also became speedily popular, and "The Collegians" (1829), a second series of the former, still further increased his reputation; on it Dion Boucicault founded his well-known play "The Colleen Bawn." Among his other works are: "Tales Illustrative of the Five Senses" (1830); "The Invasion" (1832), a historical novel; "Tales of My Neighborhood" (1835); "Gisippus, or the Forgotten Friend," a tragedy; and many spirited lyrics. He died in Cork, June 12, 1840.

Griffin, Gilderoy Wells, an American lawyer and author; born in Louisville, Ky., March 6, 1840; was educated at Louisville University, and admitted to the bar in 1861. He was consul to Copenhagen in 1871; to the Samoan Islands in 1876; to Auckland, New Zealand, in 1879; and to Sydney, Australia, in 1884. He wrote: "Studies in Literature" (1870); "My Danish Days" (1875); "New Zealand; Her Commerce and Resources" (1884); etc. He died in Louisville, Ky., Oct. 21, 1891.

Griffin, Watson, a Canadian author; born in Hamilton, Ont., Nov. 4, 1860; was educated at Toronto University; later was connected with various Canadian and American journals. His publications include: "The Provinces and the States; or Why Canada Does Not Want Annexation" (1884); "An Irish Evolution" (1887); "Canada, the Land of Waterways" (1890); "Election Points" (1896); etc.

Griffis, William Elliott, an American clergyman; born in Philadelphia, Pa., Sept. 17, 1843; was graduated at Rutgers College in 1869 and at the Union Theological Seminary in 1877; spent several years in Japan teaching and organizing schools; became pastor of the First Congregational Church of Ithaca, N. Y., in 1893. He is the author of "The Mikado's Empire"; "Corea, the Hermit Nation"; "Japan: In History, Folklore, and Art"; "Brave Little Holland and What She Taught Us"; "The Religions of Japan"; "First American Envoy in Japan"; etc.

Griffiths, John Willis, an American naval architect; born in New York city, Oct. 6, 1809; was apprenticed to the shipwright trade; became a special naval constructor in the United States navy in 1858. His inventions include a timber-bending machine, iron keelsons for wooden vessels; bilge keels to prevent rolling; improved rivets; and triple screws for great speed. He published "Treatise on Marine and Naval Architecture" (1850); "The Shipbuilder's Manual" (1853); and "The Progressive Shipbuilder" (1875–1876). He died in Brooklyn, N. Y., April 29, 1882.

Griffith's Mixture, in pharmacy, *Mistura ferri composita,* compound mixture of iron. It consists of carbonate of iron, and is prepared by rubbing 60 grains of powdered myrrh with 4 fluid drachms of spirit of nutmeg and 30 grains of potassium carbonate, then adding while rubbing 9½ fluid ounces of rose-water, then 60 grains of sugar, and lastly 25 grains of ferrous sulphate. It must be kept in a stoppered bottle. It possesses the blood-restoring properties of iron and is not astringent.

Grigorόvich, Dimitrij Vasilievich (grēg-ôr′ō-vich), a Russian novelist and prose-writer; born in Simbirsk, March 31, 1822. He began life as a civil engineer. His first stories, "The Village" and "Anton the Unfortunate," achieved wide popularity. "A Failure in Life," "The Fishers," and "The Emigrants," are realistic stories of village life which rank him among the first of Russian novelists.

Grillparzer, Franz (gril′pärts-er), an Austrian poet and dramatist; born in Vienna, Jan. 15, 1791. "Blanche of Castile," a tragedy, written at 17, and "Spartacus," a tragedy, showed genius; but "The Ancestress," first called popular attention to him. "Sappho," a tragedy based on classical tradition, made him eminent in scholarship also. "The Golden Fleece," "The Argonauts," and "Medea" constitute a trilogy. "The Career and End of King Ottokar," "A True Servant of His Master," and "Woe to Him Who Lies" demand mention; but his poem "Waves of Ocean: Thrills of Love" is the supreme manifestation of his art. "In Thy Camp is Austria," a poem of the times, created a sensation. Later works of note are "The Jewess of Toledo," "Fraternal Strife in the House of Hapsburg," and "Libussa," plays published posthumously; and a story, "The Poor Minstrel." He died in Vienna, Jan. 21, 1872.

FRANZ GRILLPARZER.

Grimaldi (grē-mäl′dē), the name of an illustrious family of Genoa, distinguished as partisans of the Guelphs, the principal members of which were: Ranieri Grimaldi, a naval commander, served as admiral of France in 1314. Antonio Grimaldi, also a naval commander and admiral, at length defeated by the combined fleets of Catalonia and Venice, under Pisani, in 1353. Giovanni Grimaldi, renowned for a great victory over the Venetian admiral, Nicolo Trevisani, in May, 1431. Domenico Grimaldi, cardinal-archbishop, and vice-legate of Avignon, distinguished at the battle of Lepanto, 1571; died in 1592. Geronimo Grimaldi (1597–1685), papal nuncio to Germany and France, and a distinguished philanthropist.

Grimaldi, Joseph, a noted English pantomimist; born in London, England, Dec. 18, 1779. He first appeared on the boards of Drury Lane when one month short of two years old, and in his third year he had his first engagement at Sadler's Wells Theater, where he regularly performed (except for one season) till his retirement from the stage, prematurely worn out by hard work, in 1828. He used regularly for some months every year to perform nightly at two theaters, and once he achieved the feat of acting at three different theaters on the same night. Charles Dickens edited his "Memoirs" (1838). He died in London, May 31, 1837.

Grimm, Herman, a German essayist, critic, and biographer, son of Wilhelm Grimm; born in Cassel Jan. 6, 1828. He was trained for the law, but never practised it. His most famous work is his "Life of Michael Angelo." Among others, "Ten Essays Selected as an Introduction to the Study of Modern Art," "Fifteen Essays" (new series), and "Life of Raphael," are noteworthy. He died June 18, 1901.

Grimm, Jakob Ludwig, a German philologist and literary historian; born in Hanau, Hesse-Cassel, Jan. 4, 1785. He was educated first under Zinkhan at Steinau an der Strasse, and then at the lyceum of Cassel. In the spring of 1802 he went to the University of Marburg to study law under Savigny, the celebrated writer on Roman jurisprudence, who, having gone to Paris in 1804, invited his pupil in the following year to join him and assist him in his literary labors. On the creation of the kingdom of Westphalia in 1806 he was appointed librarian to King Jerome Bonaparte, and in 1809 auditor in the council of state. After Jerome Bonaparte had been compelled in October, 1813, to retire from Germany, and the electorate of Hesse-Cassel restored to its former state, Jakob Grimm was appointed in December of the same year secretary of legation to accompany the Hessian minister to the headquarters of the allied army, and to the Congress of Vienna in 1814 and 1815. He was afterward sent by the Prussian government to Paris to obtain the restitution of valuable manuscripts which had been carried off by the armies of Napoleon. Resolved to retire from public life he accepted in 1816 the post of second librarian at Cassel, which he held for a period of 13 years. On the death of Völkel, the first librarian, Grimm expected that he would receive the appointment, but was disappointed, and accepted in 1830 an invitation to Göttingen both as professor and librarian. Here for seven years he delivered remarkable lectures on the history of the German languages, literature, and law. Having been one of the seven professors who in 1837 signed a protest against the measures taken by the new King of Hanover to abrogate the constitution, Grimm was deprived of his office and banished from the country. He lived in retirement in Cassel till 1841, when he was called to Berlin as member of the Academy of Sciences and as professor. He presided over the assemblies of German philologists held in Frankfort in 1846 and in Lübeck in 1847, and sat in the National Assembly of 1848 and in the Assembly of Gotha in 1849, voting with the moderate liberal party. From that time till his death, which took place in Berlin, Sept. 20, 1863, he occupied himself only with his various publications.

The labors of Grimm are of unrivaled importance in the broad field of German literary antiquities. The constant aim of his investigations was to trace the spiritual life of the German people as revealed in their laws, customs, faiths, and poetry. His first publication was "Ueber den altdeutschen Meistergesang" (Göttingen, 1811). It was followed by his "Deutsche Grammatik" (vols. I.–IV. 1819–1837), which is perhaps the greatest philological work of the age, and which may be said to have laid the foundation of the historical investigation of language. This work, as well as the great "Deutsches Wörterbuch," commenced in 1852 in conjunction with his brother Wilhelm, he did not live to complete. The completion of this latter work was undertaken by Hildebrand and Weigand, and through their labors and those of other scholars the end is slowly being approached. His "Deutsche Rechtsalterthümer" (1828), "Mythologie" (1835), "Geschichte der deutschen Sprache" (2 vols. Leipsic, 1848), and "Ueber den Ursprung der deutschen Sprache" are important and exhaustive works. He also published, in company with his brother, the "Kinder-und-Hausmärchen" (Berlin, 1812), one of the most popular collections of juvenile fairy tales, which has seen many editions; "Deutsche Sagen" (2 vols. 1816–1818); "Irische Elfenmärchen" (1826), founded on Crofton Croker's "Fairy Legends"; "Altdeutsche Wälder" (3 vols. 1813–1816); etc.

Grimm, Wilhelm, a German philologist, brother of the preceding; born in Hanau, Hesse-Cassel, Feb. 24, 1786. For the facts of his life, see GRIMM, JAKOB. He edited many old German texts, and collaborated with his brother Jakob in several of his works. His own most important book is "German Heroic Legends" (1829). His "Minor Writings" (1881–1886) contain an autobiography. He died in Berlin Dec. 16, 1859.

Grimm's Law, a law formulated by Jakob Grimm, the German philologist, relative to the changes undergone by mute consonants in the most important of the Aryan languages.

Grimod de la Reynière (grē-mō′ de lä rā-nyār′), a French wit; born in Paris, Nov. 20, 1758. He was designed for the law, but chose letters and the pleasures of the table. The biting venom of his wit, added to a grotesque hideousness of aspect, made him renowned. His celebrity was heightened by the eccentricities of his costly and delicious banquets. "Reflections on Pleasure," "The Philosophical Lorgnette." and "The Almanac of Gourmands," are in the number of his literary extravagances. He died in Villiers-sur-Orge, Dec. 25, 1837.

Grimoire (grē-mwär′), the French term for the book of formulas which sorcerers used for invoking demons; hence also gibberish.

Grimsby, or **Great Grimsby,** a parliamentary and municipal borough and seaport of Lincolnshire; on the right bank of the Humber, 20 miles E. S. E. of Hull and 41 N. E. of Lincoln. The parish church, a good cruciform edifice in the Early English style, was restored in 1859. A statue of the prince consort was unveiled in 1879, and a public park of 27 acres opened in 1883. The town is the largest fishing port in Great Britain, being mostly engaged in the cod, herring, and whelk fisheries. The industries include shipbuilding, tanning, brewing, cordage-making, and flax-dressing. In 1898 the total tonnage entered and cleared, excluding those coastwise, was 1,654,950. The imports reach the annual value of $22,500,000, and the exports $38,750,000. Pop. (1901) 63,119.

Grimston, Madge and **Hunter, William.** See KENDALL.

Grimthorpe, Edmund Beckett Denison, Lord, an English barrister and author; born in Carlton Hall, Nottinghamshire, England, May 12, 1816. He was educated at Cambridge; appointed chancellor and vicar-general of York in 1877; and was for many years a leader of the parliamentary bar. He took much interest in architecture, and designed many churches and houses. His works include: "Origin of the Laws of Nature" (1879); "A Book on Building" (2d ed. 1880); "Should the Revised New Testament be Authorized?" (1882); "Astronomy Without Mathematics"; "Treatise on Clocks, Watches, and Bells," etc. He died April 29, 1905.

Grindal, Edmund, Archbishop of Canterbury; born near St. Bees in 1519. He was educated at Cambridge. In 1559 he was made Bishop of London, in 1570 Archbishop of York, and in 1575 he succeeded Parker in the see of Canterbury, but was sequestered from his functions by the imperious queen in 1577. Not for five years was he restored, and a year later he died in Croydon, July 6, 1583.

Grindelwald (-vält), one of the most beautiful valleys (3,468 feet) of the Bernese Oberland in Switzerland, about 12½ miles long and 4 broad; it forms the approach to the two Grindelwald glaciers; it is recommended as a winter health resort.

Gringo, Harry. See WISE, HENRY AUGUSTUS.

Gringore (gran-gōr′), or **Gringoire** (gran-gwär′), **Pierre,** a French dramatist and satiric poet; born between 1475 and 1480. He early became known as a writer of moral and allegorical poems, next of satirical farces abounding in allusions to the social and political circumstances of the time. He is an important figure in literary history as one of the creators of the French political comedy. In later life he entered the service of the Duke of Lorraine as a herald, and confined his muse to religious poetry alone. He wrote: "The Game of the Prince of Blockheads" (1511), directed especially against Pope Julius II.; "The Foolish Undertakings," a series of half allegorical monologues aimed at the chief grievances in Church and State; "The Hunt for the Stag of Stags," the title being but a dimly-veiled allusion to Pope Julius; and the famous "Mystery of St. Loys" (about 1524). He died in 1544.

Grinnell, George Bird, an American editor and author; born in New York State, in 1849. He was the editor of "Forest and Stream." His works deal principally with Indian life and folklore. Among the best known are: "The Story of a Prairie People"; "The Story of the Indian"; "Pawnee Hero Stories and Folk Tales." He died in New York city, Dec. 19, 1891.

Grinnell, Henry, an American merchant; born in New Bedford, Mass., Feb. 13, 1799. In 1850 he fitted out an expedition, under the command of Lieut. E. J. De Haven, to search for the Arctic explorer Sir John Franklin. De Haven discovered land which he named Grinnell Land. He could not find Franklin and returned. In 1853, in connection with George Peabody, Grinnell fitted out another expedition for the same purpose as the first. This was under Dr. Elisha K. Kane, but was no more successful than the former one, though adding much to scientific knowledge. He died in New York city, June 30, 1874.

Grinnell Land, a barren, mountainous Polar tract, in lat. 80° N., separated from Greenland by Smith Sound and Kennedy Channel. It was discovered by Lieut. E. J. De Haven, and named after Henry Grinnell, of New York. Lieut. A. W. Greely thoroughly explored it. N. and S. it is covered with ice-caps; between them lie valleys that lose their snow in summer, and sup-

port herds of musk oxen and the usual Arctic fauna. In the interior Greely discovered Lake Hazen, 65 miles long, and two ranges of mountains, one containing a peak (Mount Arthur) 5,000 feet high.

Grip, or **La Grippe,** a disease which frequently becomes an epidemic in different parts of the United States and Europe and in the East and West Indies. It is believed to be contagious, and is somewhat similar to influenza. The symptoms are fever, headache, swelling and pain in the smaller joints, eruption of the skin, etc. It is also known as "dengue," and, in the Southern States, as "break-bone fever." The disease is produced by bacilli which, when magnified, appear somewhat like goose eggs in form and substance. They are usually discovered in pairs, and where the disease has attacked a person are abundant in the lung and bronchial tissues, and in the nasal and salivary secretions. They are imbibed in breathing, and will not breed except in a temperature of at least 80°, yet no degree of natural cold can kill them. When in a temperature below that mentioned they remain in a dormant state. In 1892, the grip germ was discovered in Berlin by Prof. Robert Pfeifer, who observed that it breeds by lengthening itself and then dividing in the middle. This operation requires about 20 minutes, and wonderful as it may seem, is continued until it produces 16,500,000 germs in 24 hours.

Gripe, a brake applied to the wheel of a crane or derrick; it generally consists of an iron hoop under the control of a lever, and is drawn closely around the wheel to check its motion. As a nautical term: (1) The fore-foot of a ship, on to which the stem is fastened; the forward end of the keel. It is scarfed to the stem piece and false keel, and is secured by a horsehoe or ring to the stem. (2) A broad plait of rope or bars of iron, with lanyard rings and claws, passing over a large boat, and by which it is secured to the ring bolts of the deck. (3) One of a pair of bands passing round a boat near the stem and stern when suspended from the davits, to prevent the boat from swinging about.

Gripes, a popular name for keen but more or less intermittent pains in the abdomen, produced by colic or any similar disease.

Griqualand (grē'kwa-) **West** and **East,** two British districts of South Africa, named from the Griquas or Bastaards, a mixed race sprung from Dutch settlers and native women. GRIQUALAND WEST lies to the N. E. of Cape Colony, is bounded on the S. by the Orange river, on the N. by Bechuana territory, on the E. by the former Orange Free State, now the Orange River Province; on the W. by the Kalahari country; area, 15,197 square miles; pop. (1891) 83,375, of whom 29,670 are whites. Portions of the country are suitable for sheep farming and agriculture, but the chief source of wealth is the diamond fields. The first diamond was discovered in 1867. Diamonds to the value of $75,000,000 were found there between 1883 and 1887, and the daily output of the consolidated mines at Kimberley was estimated in 1900 at $220,000. KIMBERLEY (*q. v.*), which has had railway connection with the Cape since 1885, is the chief center of the diamond industry and the seat of government. The chief towns are De Beers, Du Toit's Pan, Bultfontein, Barkly, and Griqua Town. Griqualand West is now incorporated in the Cape and constitutes four of the 77 divisions. GRIQUALAND EAST is that part of No-Man's-Land which lies between the Kaffir border and S. Natal; area, 7,594 square miles; pop. (1904) 222,685, of whom 5,901 are whites. This territory was annexed to the Cape in 1875, and is now under colonial rule, having one chief magistrate and nine subordinates. Chief village, Kokstadt.

Grisebach, Eduard (grē'ze-bach), a German author; born in Göttingen, Oct. 9, 1845. He was a consular agent for many years. "The New Tannhäuser" and "Tannhäuser in Rome," represent his poems. "German Literature Since 1770," and "The Goethe Period of German Poetry," are masterpieces. He utilizes philological studies in "The Faithless Widow," in tracing an old Chinese legend through its transformations in all literatures. "Kin-Ku-Ki-Kuan" is a similar study. His editing of Schopenhauer has been very important.

Griseldis (-zel'-), the name of the heroine of a popular tale of the Middle Ages, originally apparently Italian, but which was subsequently adopted by various other nations. She was, originally, a poor charcoal-burner, whom the Marquis Walter de Saluzzo took to wife, and then put her humility and obedience to the hardest tests; but she having victoriously surmounted them, a reconciliation took place. As a tale, said to have an historical foundation, we first meet with it in Boccaccio's "Decameron." It was translated into Latin by Petrarch in 1373, and in the 15th century it was well known in Germany. It was dramatized in Paris in 1393, in England in 1599, and in Germany, by Hans Sachs, in 1546.

Grisi, Giulia (grē'sē), an Italian singer; born in Milan, May 22, 1812. Her father (Garcia) was an officer of engineers in the army of Napoleon I., and her aunt the once famous cantatrice Josephine Grassini. She made her début at Bologna in a con-

tralto part, appeared in "Romeo and Juliette" at Florence and at Milan, and made her first appearance in Paris and London in 1834, as Ninetta in "La Gazza Ladra," where she achieved a decided success. Every part which she assumed afterward steadily increased her reputation, which may be said to have been established by her impersonation of the queen in "Semiramide," and of Donna Anna in "Don Giovanni." Her fame reached its climax in her rendition of the rôles of "Norma" and "Lucrezia Borgia," in which characters her singing and dramatic acting have never been surpassed. She was twice married; on the second occasion to the unrivaled tenor, Signor Mario, Marquis de Canada, with whom she visited the United States in 1854, singing in the principal cities. She died in Berlin, Nov. 29, 1869.

Gris-nez (grē-nā′), **Cape,** a headland 164 feet high, in the department of Pas-de-Calais, France, opposite Dover, is the point of land nearest to the English shore, the distance being barely 20 miles. About equally distant from Calais on the N. E. and Boulogne on the S., the cape marks the dividing line between the North Sea and the English Channel. It is surmounted by a lighthouse.

Grison (grē-zôn′), or **Huron,** a South American weasel (*Galictis vittata*), somewhat larger than the European weasel, and often kept in captivity.

Grisons (grē-zôn′), or **Graubünden** a canton of Switzerland; the largest and the most thinly peopled; bounded by Tyrol and Lombardy; area, 2,773 square miles; capital, Chur. The whole canton is an assemblage of mountains intersected by narrow valleys. These last form three groups, of which the first and most important lies along the course of the Rhine, and stretches N., occupying nearly the whole of the W. portion of the canton; the second, forming the Engadine, extends N. E. along the course of the Inn; and the third comprises several smaller valleys, whose streams run S., belonging to the basins of the Ticino and the Adige. Pastures and forests occupy a large portion of the canton; cattle and timber are the principal exports. Numerous mineral springs are found within the canton; also the health resorts of Davos, the Upper Engadine, Seewis, etc. Iron, lead, copper, zinc, and silver occur. Within the Grisons, too, are several passes leading to Italy, such as the Splügen, St. Bernardino, Bernina. The country was anciently inhabited by the Rhætii, who are supposed to have been of Etruscan race. It was conquered by the Romans under Augustus, and added by Charlemagne to his empire in 807. During the Middle Ages the Bishop of Chur was the most powerful of the numerous nobles who sought to oppress the people, till they in self-defense formed themselves into leagues. One of these leagues, formed in 1424, was called the gray league from the gray homespun worn by the unionists, and hence the German and French names of the canton — Graubünden and Grisons. In 1471 these separate unions entered into a general federation, which then (1497–1498) formed an alliance with the Swiss cantons. Pop. (1905) 107,605.

Griswold, Alexander Viets, an American clergyman; born in Simbury, Conn., April 22, 1766; ordained in the Protestant Episcopal Church in 1795; made bishop over "The Eastern Diocese," including all of the New England States except Connecticut, in 1811. His publications include "The Reformation and the Apostolic Office" (1843); "Discourses on the Most Important Doctrines and Duties of the Christian Religion" (1830); etc. He died in Boston, Mass., Feb. 15, 1843.

Griswold, Hattie Tyng, an American author; born in Boston, Jan. 26, 1842. She wrote many tales and poems; published "Apple Blossoms" (1878); "Home Life of Great Authors" (1886); and "Personal Sketches of Great Authors" (1898). "Under the Daisies" is one of her best-known poems. She died in 1909.

Griswold, Rufus Wilmot, an American editor; born in Benson, Vt., Feb. 15, 1815. After extensive travels at home and in Europe, he learned printing and newspaper work, next became Baptist preacher, then journalist and compiler of books in turn at Philadelphia, Boston, and New York. The most important paper which he edited during his career, the "International Magazine," was afterward amalgamated with "Harper's Magazine." His books are numerous, and include: "Poets and Poetry of America" (1842); "Poets and Poetry of England in the 19th Century" (1845); "Prose Writers of America" (1846); "Female Poets of America" (1848); and "The Republican Court, or American Society in the Days of Washington" (1854). He died in New York city, Aug. 27, 1857.

Grivet, a monkey with greenish-gray fur, some white hairs near the hinder extremities, the tail gray; found in Africa.

Grievennick (-wen′-), a small silver coin current in Russia of the value of 10 kopecks, or about 4 cents.

Grizzly Bear, a huge bear, sometimes 9 feet from the nose to the end of the very short tail, and weighing 800 pounds. The hair, which varies between gray and blackish brown, is more or less grizzled, whence the animal's English name. It inhabits North America, especially the Rocky Moun-

tains. It feeds partly on fruits and roots, and partly on animal food.

Groat, a name given in the Middle Ages to all thick coins, as distinguished from the "bracteates" or thin coins of silver or gold-leaf stamped so as to be hollow on one side and raised on the other. The silver groat current in England, introduced by Edward III., was equal to four pence. The coin was revived in 1836–1856 in the modern fourpenny-piece. Groschen, the German equivalent of groats, were till 1873–1876 current in the N. of Germany, and equal in value to one-thirtieth of a thaler, worth 2¼ cents, United States currency.

Groats, the seeds of oats prepared as an article of food by being deprived of their hulls. They are much used in the preparation of gruel for invalids.

Grocyn, William, an English philologist; born in Colerne, Wiltshire, about 1446; educated at Winchester and New College, Oxford. He pursued his studies afterward in Italy, acquiring a knowledge of Greek from the Greek exile Chalkondylas; and settled again in 1491 at Oxford, where Sir Thomas More was among his pupils. He is noted as the first professor of Greek, at Oxford. When Erasmus visited Oxford he lived in Grocyn's house, and he speaks of him as his "patron and præceptor." In 1506 he became master of Allhallows' College, near Maidstone, and there he died in 1519.

Grodno (grod'nō), a town of Russia; on the Niemen, 148 miles N. E. of Warsaw. It has a medical academy and manufactures in cloth and tobacco. The new palace, erected by Augustus III. of Poland, is a handsome edifice. At first a Russian town, Grodno fell to Lithuania in 1241. Here Stephen Bathori died in 1586; here in 1793 the Polish diet ratified the second partition of Poland; and here, too, Stanislaus Augustus, the last King of Poland, abdicated in 1795. Pop. (1897) 46,871.

Groin, in anatomy, the hollow in the human body where the thigh and the trunk unite. In architecture, the angle or angular curve formed by an intersection of vaults; most of the vaulted ceilings of the Middle Ages were groined, and therefore called groined ceilings. During the early part of the Norman style the groins were left purposely plain, but afterward they were invariably covered with ribs.

In civil engineering, a frame of wood work, constructed across a beach, between high and low water, perpendicular to the general line of it, either to retain the shingle already accumulated, to recover it when lost, or to accumulate more at any particular point; also to break and check the action of the waves. The component parts of a groin are piles, planking, land ties, land tie bars, blocks, tail piles, and keys and screw bolts.

Grolier de Servières, Jean (grō-lyā' de ser-vyār'), a French bibliophile; born in Lyons in 1479; attached to the court of Francis I., went to Italy as intendant-general of the army, and was long employed in diplomacy at Milan and at Rome. He acquired choice copies of the best works then existing, and had them magnificently and tastefully bound. He had no less than 3,000 books, and of these about 350 have come to light, bound elegantly in brown calf, both sides ornamented with floral arabesques. The library was dispersed in 1675, and Grolier's books are now precious prizes to the bibliophile. He died in Paris in 1565.

Gromwell, the name of plants of the genus *Lithospermum,* natural order *Boraginaceæ,* containing a number of widely distributed species, several of which are natives of America. The seeds of *L. officinale* are occasionally used as a diuretic.

Groningen (Grō-ning'Gen), a city and capital of the province of Groningen, Netherlands, on Dollart Bay, 25 miles S. W. of Delfzihl. The university, founded in 1614, possesses a library, a botanic garden, an observatory, a collection of Teutonic antiquities, a hospital, and a museum of natural history. A celebrated deaf and dumb institution was founded by Guyot in 1790. Groningen, already an important place in the 9th century, joined the Hanseatic League in 1282. From the 11th century it fought hard to maintain its independence against the bishops of Utrecht, nor did it submit until 1493, and then only to escape being handed over by the emperor to the Duke of Saxony. During the 16th century it had a very stormy history, being finally won for the United Netherlands by Maurice of Nassau in 1594. Pop. (1906) 72,324.

Groningenist, in Church history, one of a subdivision of the sect of Anabaptists, formed at Groningen in the Netherlands.

Gronnet. See Grunnet.

Gronovius, Abraham (grō-nō'vi-us), a Dutch librarian; born in Leyden, Holland; son of Jacob Gronovius; became librarian of the University of Leyden. He edited "Justinus Pomponius Mela" and "Tacitus." He died in Leyden, Holland, in 1775.

Gronovius, Jacob, a Dutch educator; born in Deventer, Holland, Oct. 20, 1645; son of Johann Friedrich; was educated in England; became Professor of Belles-Lettres in Pisa and Leyden. He edited "Stephanus Byzantius"; "Harpocration Lex"; "Pomponius Mela"; "Herodotus"; "Ammianus Marcellinus"; etc. His fame rests principally on his edition of the

voluminous "Treasury of Greek Antiquities" (13 vols. 1697–1702). He died in Leyden, Holland, Oct. 21, 1716.

Gronovius, Johann Friedrich, a German critic; born in Hamburg, Germany, Sept. 8, 1611; studied in Jena, Leipsic, Altdorf, Leyden, and Groningen; was Professor of History and Eloquence in Deventer in 1642, and Professor of History and Greek in Leyden in 1659. He edited "Livy" (1645); the two "Senecas" (1649); "Gellius" (1651); "Tacitus" (1672); etc. He died Dec. 28, 1671.

Gronovius, John Frederick, Dutch botanist; born in Leyden, Holland, in 1690; brother of Abraham. He was the author of "Virgin Flowers" (1743); and "Flowers of the Orient" (1765). He died in Leyden, Holland, in 1760.

Gronovius, Laurence Theodore, a Dutch author; born in 1703; son of Johann Freidrich. His publications include "Ichthyological Museum" (1754–1756); "Principal Animals of the Bible" (1760); etc. He died in Leyden, Holland, in 1778.

Groombridge, Stephen, an English astronomer; born in 1755; built a private observatory at Blackheath, and devoted 10 years to the observation of all the stars down to the eighth magnitude between +40° and the pole, and then 11 years to their reduction, which his health did not allow him to finish; but it was completed under the direction of Sir George Airy, and the work published at government expense in the form of a catalogue of circumpolar stars, known by Groombridge's name. He died in 1832.

Groote Eylandt (grōt ī'länt), the largest island in the Gulf of Carpentaria. N. of Australia, belonging to the colony of South Australia; greatest length and breadth, 40 miles each.

Gros, Baron Antoine Jean (grō), a French painter; born in Paris, March 16, 1771; studied in the school of David, and first acquired celebrity by his picture of "Bonaparte on the Bridge of Arcole." His first great achievement, however, was "Napoleon Visiting the Plague-smitten at Jaffa" (1804); and scarcely less successful were the "Battle of Aboukir" (1806); and the "Battle of Eylau" (1808). Gros also painted several other historical pictures illustrating the achievements of Napoleon; the "Meeting of Charles V. and Francis I." (1812); in 1811–1824, an immense work for the cupola of the Church of Saint Geneviève; the "Departure of Louis XVIII. for Ghent" (1815); and the "Embarkation of the Duchess of Angoulême" (1815). His body was found in the Seine near Meudon, June 27, 1835.

Grosbeak, or **Grossbeak,** in ornithology, the English name of *Coccothraustinæ*, a sub-family of *Fringillidæ*. The cardinal grosbeak, an American bird. The pine grosbeak is *Loxia enucleator*, called also pine bullfinch; and the social or republican grosbeak is *Philæterus socius*. It is from South Africa, and belongs to the sub-family of *Ploceinæ*, or weaver birds.

Groschen, a small silver coin used in the North German States, value about 2⅓ cents. Each groshen is sub-divided into 10 pfennigs.

Grose, Francis, an English antiquary; born in Greenford, Middlesex, in 1731. His "Antiquities of England and Wales" (1773–1787) proved a success, and in 1789 he set out on an antiquarian tour through Scotland. Grose's work on the antiquities of Scotland appeared 1789–1791; that of Ireland in 1791. Works of exceptional value are: "A Classical Dictionary of the Vulgar Tongue" (1785); and "A Provincial Glossary" (1787). Other works are his "Treatise on Ancient Armor and Weapons" (1785–1789); "Military Antiquities" (1786–1788); "The Grumbler" (1791), a collection of amusing essays; and "The Olio" (1793), a strange hotch-potch of jests, verse and prose essays. He died in Dublin, Ireland, May 12, 1791.

Gross, Samuel David, an American surgeon; born in Easton, Pa., July 8, 1805; was graduated at Jefferson Medical College, 1828; Professor of Pathological Anatomy in Cincinnati Medical College 1835–1839; Professor of Surgery in University of Louisville 1839–1850, and at University of New York 1850–1851; Professor of Surgery in Jefferson Medical College 1856–1884. He was the author of several works, including "System of Surgery"; "Manual of Military Surgery"; and "American Medical Biography." He was the founder and chief editor of the "North American Medico-Chirurgical Review," and president of the American Medical Association 1867. He died in Philadelphia, Pa., May 6, 1884.

Grossbeak. See GROSBEAK.

Grosse, Julius (grōs'se), a German author; born in Erfurt, April 25, 1828. He was successively lawyer, playwright, and journalist. His poems include "The Maid of Capri"; "Pesach Pardel"; and "Against France." Among his stories are: "Untrue Through Sympathy"; "An Old Love"; "A Revolutionist"; and "Against the Stream" — dainty and interesting narratives. A tragedy, "Tiberius," has been often staged.

Grosseteste, Robert (grōs'test), an English clergyman; born in Stradbroke, Suffolk, about 1175; educated at Lincoln, Ox-

ford, and Paris; he had for some years been the first teacher of theology in the Franciscan school at Oxford, and had held eight archdeaconries and other preferments, when in 1235 he was elected Bishop of Lincoln. He forthwith undertook in the most vigorous fashion the reformation of abuses, embroiling himself thereby first with his own chapter and next with Pope Innocent IV., whom he twice visited at Lyons, in 1244–1246 and 1249–1250. He was excommunicated by Innocent, but the feeling of the English nation sustained him, his clergy went on obeying him as if nothing had happened. He died in Buckden, Oct. 9, 1253.

Grossi, Tommaso (grōs'sē), an Italian author; born in Bellano, Jan. 24, 1791. Satirically pungent political poems, "The Fugitive," a narrative in verse, made his reputation; and a play, "Sforza, Duke of Milan," was a literary sensation. His "Ildegonda" is a poem on a mediæval legend; "The Lombards in the First Crusade," a happy essay in meter; "Marco Visconti," a historical romance. Of his lyrics, "The Swallow" has found most favor. "Ulrich and Lida" was his last work. He died in Milan, Dec. 20, 1853.

Grosswardein (grōs'vär-dīn), or **Nagyvard** (nagy'vä-rod), a town of Bihar Co., Hungary; on the Sabes Körös, 152 miles S. S. E. of Pest. Formerly a fortress, it is now the seat of a Roman Catholic and of a Greek bishop, has several churches, and manufactures spirits, oil, vinegar, tiles, matches, pottery, and wine. In the neighborhood is the Bishop's Bath, with alkaline sulphur springs. At Grosswardein peace was concluded between Ferdinand I. of Austria and John Zapolya of Transylvania in 1538. It was taken and pillaged by the Turks in 1660, and remained in their hands till its recapture by the Austrians in 1692. Pop. (1900) 50,177.

Grosvenor, Edwin Augustus (grō've-), an American educator; born in Newburyport, Mass., Aug. 30, 1845; was graduated at Amherst College in 1867 and at Andover Theological Seminary in 1872; Professor of History at Robert College, Constantinople, in 1873–1890; accepted the chair of European History at Amherst College in 1892. His publications include "The Hippodrome of Constantinople"; "Constantinople"; "The Permanence of the Greek Type"; "Contemporary History"; etc.

Grosz, Ferdinand (grōs), an Austrian journalist; born in Vienna, April 8, 1849. He wrote while still a boy; but his first success was "Literary Music of the Future" (1877). Since then he has traveled extensively and written for the best papers. "In Passing," "Unbound," "Passion-Play Letters," "Leaves in the Wind," and other collections, have been very popular. His poems, notably "Songs from the Mountain Tops," and his plays, "The First Letter" and "At Three o'Clock," are of special merit.

Groszmann, Gustav Friedrich Wilhelm (grōs'män), a German dramatist; born in Berlin, Nov. 30, 1746. While in the diplomatic service, he became intimate in a literary circle which included Lessing; and successively wrote in a few days each "The Fire of Passion," a comedy, and "Wilhelmine von Blondheim," a tragedy, which were extremely successful. He turned actor, rose to high reputation, and produced much admired comedies. He died in Hanover, May 20, 1796.

Grote, George, an English historian; born in Clayhill, Kent, Nov. 17, 1794; died in 1871; educated at Sevenoaks and at the Charterhouse, he entered in 1810 as a clerk in his father's banking establishment. In 1832 he was elected a member of Parliament for the city of London, and his subsequent parliamentary career, until his retirement in 1841, was principally devoted to the advocacy of vote by ballot. He was also a leader of the "Philosophic Radicals." In 1846 appeared the first two volumes of his "History of Greece." The remaining 10 volumes followed in rapid succession, the final volume being published in 1856. The work terminates with the death of Alexander the Great. In 1865 he published "Plato and the Other Companions of Socrates," and was engaged at the time of his death on an elaborate treatise on "Aristotle and the Peripatetics." In the latter part of his life he was concerned in the management of University College, the London University, and the British Museum. He died in London, June 18, 1871.

GEORGE GROTE.

Grotefend, Georg Friedrich (grō'tefent), a German archæologist; born in Münden, Hanover, June 9, 1775; educated at the University of Göttingen. He filled scholastic appointments at Göttingen, Frankfort-on-the-Main, and Hanover. He wrote learned books and papers on Latin, Umbrian, and Oscan philology, coins of Bactria, etc., but made for himself an enduring fame by deciphering the cuneiform alphabet first given forth

in 1802. Later works on this subject were "New Contributions Toward the Explanation of the Persian Cuneiform Writings" (1837), and "New Contributions Toward the Explanation of the Babylonian Cuneiform Writings" (1840). He died in Hanover, Dec. 15, 1853.

Grotefend, Karl Ludwig, a German historian; born in Frankfort-on-the-Main, Dec. 22, 1809; studied at Göttingen University, and filled from 1853 a post in the Royal Archives at Hanover. His works are of the greatest value for numismatics and Roman epigraphy, the chief being "The Coins of the Greek, Parthian and Indo-Scythian Kings of Bactria" (1839), "The Roman Empire Described by Tribes" (1863), and "Athenian Silver Money in Chronological Order" (1872). His historical papers are mostly contained in the "Journal of the Historical Society of Lower Saxony" (1850-1874). He died Oct. 27, 1874.

Grotesque, a term used in painting by the Italians; appropriated to that peculiar manner of composition and invention observed among the antique monumental paintings which were discovered in the subterranean chambers that had been decorated in the times of the ancient Romans.

Grothite, a mineral akin to titanite or sphene, but differing from it in cleavage. It is clove-colored or dark brown in mass, and reddish-brown and translucent in thin splinters. Hardness, 6.5; specific gravity, 3.5 to 3.6. Composition: Silica, 30.51; titanic acid, 31.16; sesquioxide of iron, 5.83; lime, 31.34. It occurs in syenite near Dresden.

Grotius (grō'shi-us), or **De Groot, Hugo** (grōt), a Dutch statesman; born in Delft, Holland, April 10, 1583. In 1599

HUGO GROTIUS.

he commenced his career as advocate; and he was successively appointed historiographer, advocate-general of Holland and Zealand, a member of the states-general, and envoy to England. In 1613 he became syndic, or pensionary, of Rotterdam, and declaring himself on the side of Barneveldt, he supported him and the cause of the Arminians by his pen and influence. But he narrowly escaped the fate of Barneveldt, who suffered on the scaffold, and received sentence of imprisonment for life in the fortress of Lœwestein. From this, however, at the expiration of 18 months, which he had employed in writing his celebrated "Treatise on the Truth of the Christian Religion," he succeeded in escaping. This was effected by the management of his wife, who contrived to have him carried out of the castle in a chest that had been used for the conveyance of books and linen. Grotius at first sought an asylum in France; and it was during his residence there that he composed his great work, "The Justice of War and Peace." On his return to his native country he was condemned to perpetual banishment. He passed the remnant of his life in the diplomatic service of Sweden, dying Aug. 28, 1645.

Groton, a town in New London co., Conn., on the Thames river and Long Island Sound, opposite New London. There still may be seen Fort Griswold, memorable for the massacre of an American garrison by the British in 1781. The British having captured the fort after a desperate resistance, Colonel Ledyard, the American commander, surrendered to the officer of the detachment, and was immediately killed with his own sword, most of his men being also butchered. A granite monument, to commemorate that event, was erected in 1830. Pop. (1900) 5,962; (1910) 6,495.

Grotta del Cane (grōt'tä del kä'ne) ("Grotto of the Dog"), a small cave near Naples, in the vicinity of Lake Agnano and of Puzzuoli. This cave was known to the ancients, and is described by Pliny. It derives its name from the practice of introducing into it small dogs, which are soon almost deprived of life by the gas that owing to its density clings to the floor of the cave; but they soon recover upon being restored to the open air.

Grouchy, Marquis Emmanuel de (grö-shē'), a French military officer; born in Paris, Oct. 23, 1766; entered the army at 14; threw in his lot with the Revolution, and had his first taste of serious work in helping to suppress the Vendean revolt. After being nominated second to Hoche for the abortive expedition to Ireland, though Grouchy did enter Bantry Bay, he proceeded to join Joubert in Italy in 1798. Under Moreau he greatly distinguished himself in Piedmont, and at Novi was taken prisoner, but subsequently exchanged in 1799. Later he fought with conspicuous gallantry at Hohenlinden, Eylau, Friedland, Wagram,

and in the Russian campaign of 1812, being appointed during the memorable retreat leader of the bodyguard of Napoleon. After the disastrous battle of Leipsic, Grouchy covered the retreat of the French on the W. side of the Rhine. Among the first to welcome Napoleon after his escape from Elba, Grouchy destroyed the Bourbon opposition in the S. of France, and then, hastening N., routed Blücher at Ligny. After the defeat at Waterloo and the second abdication of Napoleon, Grouchy, appointed by the provisional government commander-in-chief of the broken armies of France, led them skillfully back toward the capital; then, resigning, he went to the United States. He returned from exile in 1819, and was reinstated as marshal in 1831. He died in St. Étienne, May 29, 1847.

Ground Base, or **Ground Bass,** in music, a bass passage of four or eight bars in length, constantly repeated, each successive time accompanied with a varied melody and harmony.

Ground Dove, a name of various species of pigeons, which resemble the gallinaceous birds in living mainly on the ground, their feet being better suited for walking than perching. The name is especially given to the members of the genus *Chamæpelia,* small birds belonging to the warmer parts of America, and includes the bronze-wing pigeons of Australia. The large pigeons of the genus *Goura* (the crowned pigeons) are also so called.

Ground-Hog Day, the 2nd of February, on which day, it is said, the ground-hog comes out of his hole, and if he sees his shadow goes back again and remains six weeks, which indicates a late spring. If he fails to see his shadow he does not return to his hole, and the spring will be early.

Ground Ivy, a labiate plant, with blue purple flowers and deeply crenate pubescent leaves, found in hedgerows and copses. It is found also in the N. of Europe, on the continent of Asia, and in Japan. It is bitter and aromatic. It was formerly used for beer and tea. Country people employ it as a pectoral medicine.

Group, in art, the union of several figures, or of various material objects placed in contact with each other, for the purpose of forming a single mass. It is necessary that some of the figures comprised in a group be subordinate to the rest, that those which are most important in the action be also the most prominent, and call the attention to the place which they occupy in the group by the attitude, light, development, etc. In music, a series of notes, of small time value, grouped together; a division or run; also the method of setting out band parts in score. In mineralogy, a number of minerals essentially agreeing in their chemical composition. Dana has a group called fluorides, another called oxygen-compounds, etc. Many of these again are subdivided. In geology, a series of rocks, or strata, which, speaking broadly, were deposited at the same period. Lyell arranged the fossiliferous strata in groups and periods, the former referring to the order of succession on the surface of the earth, the latter to the series of events thence inferred. In botany, a particular grade in classification. Lindley had groups in his "Natural System of Botany," though he abolished them in his "Vegetable Kingdom." The designation group was inferior in extent to sub-class, and superior to alliance. In zoölogy, a designation which may be considered as equivalent to "tribe," and superior to "family."

Grouse, in ornithology, various gamebirds, specially the *Tetrao tetrix,* called the black grouse, and *Lagopus scoticus,* the

RUFFED GROUSE.

red grouse. The male of the former is called the black cock, and the female the gray hen. The red, called also the common grouse, inhabits moors, feeding on the young shoots of the heath. Besides *Tetrao,* the grouse family contains the genus *Lagopus* (Ptarmigan), etc., the ruffed grouse is the genus *Bonasia;* sand grouse are the family *Pteroclidæ;* and the wood grouse is the *Capercailzie.* They are well known to be large, plump, somewhat heavy birds, usually short-tailed, and with beautifully variegated plumage, which must often be protective. They are especially abundant in the N. parts of both Old and New World. They frequent woods, roost in trees, nest on the ground, and fly straight and swiftly. The male is famous for his habit of drumming, or beating stiffly downward with his wings and making a loud drumming noise. The largest American grouse is the cock of the plains or sage cock. It is dispersed over the W. plains, and, according to Elliot, owes the bitter unpalatable character of its flesh to its diet of artemisia or wild sage which abounds in these regions. The tail is re-

markably long, the neck sacs very large, the usually hard gizzard portion of the stomach remains soft.

Grove, in comparative religion, a group of trees under which religious worship is held.

Ethnic.— The sacred character of groves is closely connected with tree and serpent worship. Bearing in mind the dictum of Statius "Fear first made the gods of the world," one can imagine how the solitude and mystery of primeval forests must have wrought on uncultured races, and led them to hold such places in reverence as the abode of the mighty and not always beneficent nature-forces. As man progressed, and the objects of his worship became personified, the sacred character of groves by no means passed away. The grove at Dodona will prove the case for Greece; and there is scarcely a Latin poet whose works do not furnish instances in point. Ovid tells of the fate that befell Erisichthon, because he ravaged Ceres' sacred grove. The "Germania" of Tacitus furnishes the earliest testimony to the estimation in which groves were held by Teutonic and kindred nations. Other passages occur in the "Annals" and the "History." From Pliny we learn the part that groves of oak trees played among the ancient Druids, and he seems to favor the derivation of their name from the Greek "drys." There is also a fine passage on the same subject in Lucan. In remote places, a belief in the sacredness of groves still lingers.

Jewish.— In a solitary passage of the Old Testament, "grove" is the probably correct rendering of the Hebrew word *eshel.* Abraham "planted" one in Beersheba, and "called there on the name of the Lord, the everlasting God" (Gen. xxi: 33). The original meaning of the word *eshel* is a particular tree; Gesenius thinks the Oriental tamarisk, which, however, would scarcely be shady enough, *Elon,* rendered in the Authorized Version "plain," seems to mean "grove." If so, then Abraham at a certain period lived in one, that of Mamre (Gen. xiv: 13), and built an altar in it to Jehovah (Gen. xiii: 18); while in a second one there was an important pillar (Judg. ix: 6). Other groves were those of Moreh (Gen. xii: 6), of Zaanaim (Judg. iv: 11), of Tabor (I Sam. x: 3), etc.

In all other cases in the text of the Authorized Version, "grove" is the rendering of the Hebrew word *Asherah,* which is almost certainly an idol, and not a plantation of trees, for Josiah brought one out of the house of the Lord (II Kings xxiii: 6). The people of Judah also "built them" high places, images, and groves (I Kings xiv: 23). The combination of images and groves occurs constantly (II Kings xvii: 16; II Chron. xiv: 3; Isa. xxvii: 9, etc.). The idol seems to have been of wood, for it could both be cut down (Exod. xxxiv: 13; Deut. vii: 5; Judg. vi: 25-28; II Kings xviii: 4. xxiii: 14; II Chron, xiv: 3, xxxi: 1, xxxiv: 3-4) and burnt (Deut. xii: 3; II Kings xxiii: 15). It was upright, and therefore probably of the human and not the bestial form (Isa. xxvii: 9). The name Asherah recalls that of the Phœnician goddess Ashtoreth; the former, as suggested by Bertheau, being probably the name of her idol, the latter of herself. There was a relation between Baal and Asherah, and while in Elijah's time there assembled at Carmel 450 prophets of Baal, there were with them 400 "Prophets of the groves" (I Kings xviii: 19). The Asherah seems to have been connected with phallic rites.

Grove, Sir George, an English author; born in Clapham, England, in 1820; was trained as a civil engineer, and erected in the West Indies the first two cast-iron lighthouses built. As a member of the staff of Robert Stephenson he was employed at the Chester general station and the Britannia tubular bridge. He was secretary to the Society of Arts from 1849 to 1852, and secretary to the Crystal Palace Company from 1852 to 1873, where he subsequently became a director. He was editor of "Macmillan's Magazine," a large contributor to Smith's "Dictionary of the Bible," and editor and part author of the great "Dictionary of Music and Musicians"; and these and his zeal and success in promoting the love of good music secured for him the degree of D. C. L. from Durham University in 1872, and LL. D. of Glasgow in 1886. He was knighted in 1883 on the opening of the Royal College of Music, Kensington Gore, of which he was made Director by the Prince of Wales. He also assisted Dean Stanley in some of his works on the Bible and the East, and was founder of the Palestine Exploration Fund. He died in London, England, May 28, 1900.

Grove, Sir William Robert, an English physicist; born in Swansea, Wales, July 11, 1811; became interested in the study of experimental physics and electricity early in life. He won fame by the invention of the Grove voltaic battery in 1839; was Professor of Experimental Philosophy in the London Institution in 1840–1847. Later he studied law and became queen's counsel in 1853, and a judge in the High Court of Justice in November, 1875. He was the author of "The Correlation of Physical Forces"; "Voltaic Ignition" and "Decomposition of Water into its Constituent Gases by Heat." He died in London, England, Aug. 2, 1896.

Grove Battery, a double fluid galvanic battery, invented in 1839 by Sir William

Grove. It consists of a plate of amalgamated zinc, generally bent into a shape like the letter U, so as to embrace a flat cell of porous earthenware in which is suspended a sheet of platinum foil. The porous cell is filled with strong nitric acid, and the whole arrangement placed in a jar containing dilute acid 1 in 20.

Grove City College, a non-sectarian coeducational institution in Grove City, Pa.; organized in 1876; chartered in 1884; has grounds and buildings valued at over $375,000; endowment, $25,000; volumes in the library, 6,000; fellowships, 5; ordinary income, about $35,000; average number of faculty, 25; average student attendance, about 725; number of graduates, over 1,500.

Grove Gas Battery, an electric battery in which there are two glass tubes, and within each a platinum electrode, covered with finely-divided platinum, and furnished on the outside with binding screws. One of the tubes is partially filled with hydrogen, the other partially with oxygen, and they are inverted over dilute sulphuric acid, so that half the platinum is in the liquid and half in the gases. By joining the dissimilar plates a battery is produced so powerful that one element of it will decompose iodide of potassium, and four will decompose water.

Grover, Cuvier, an American army officer; born in Bethel, Me., July 24, 1829; was graduated at the United States Military Academy in July, 1850, and entered the army as brevet 2d lieutenant of artillery. On the outbreak of the Civil War he was a captain in the 10th Infantry, and with his command in New Mexico. Returning East, he was, April, 1862, appointed a Brigadier-General of volunteers, and assigned to duty with the Army of the Potomac, participating in the various battles of the Peninsular campaign in Virginia, and in the second battle of Bull Run. In December, 1862, he was in command of a division of the 19th Corps in the Department of the Gulf. In August, 1864, he was assigned to the command of the 19th Corps, and in the Shenandoah campaign was engaged in the battles of Opequan, Fisher's Hill, and Cedar Creek; subsequently commanded the district of Savannah, Ga., and was mustered out of the volunteer service August, 1865; in 1875 became colonel of the 1st Cavalry. He died in Atlantic City, N. J., June 6, 1885.

Grow, Galusha Aaron, an American legislator; born in Eastford, Conn., Aug. 31, 1824; was graduated at Amherst College in 1844, and admitted to the bar in 1847; settled in Towanda, Pa., and there practised; was a member of Congress in 1851-1863 and speaker during the last two years. In 1871–1876 he was president of the International and Great Northern Railroad of Texas. In 1894 he was elected Representative-at-Large by a plurality of 297,446 over DeWitt, the Democratic nominee, and a majority of 269,778 over all other candidates, these being the largest numbers of votes ever given in any State of the Union to any candidate for any office. He was reëlected in 1896, 1898, and 1900. He died March 31, 1907.

Grub, a name generally applied to the worm-like larvæ of insects when they have a distinct head but no legs, *e. g.*, in bees and some beetles. In distinction therefrom, a larva without distinct head and without limbs, is a maggot, but with distinct head and limbs, anterior as well as posterior, is a caterpillar.

Grubb, Howard, an optician and telescope-maker of considerable celebrity at Dublin, Ireland. The largest telescope of his construction is the 27-inch of the Vienna Observatory. He was the first to suggest a movable floor for an observatory dome, which has been adopted in the dome of the great 36-inch telescope of the Lick Observatory. This arrangement makes access to the eye-end of a large equatorial in all positions much easier than by means of a tall and heavy observing chair.

Grübel, Konrad (grü'bel), a German poet; born in Nuremberg, June 3, 1736. He was a saddler and harness-maker, and passed his youth in privation; but he possessed genuine poetic gifts, as shown in the pictures he has given of the lives and manners of his countrymen in the three volumes of "Poems in the Nuremberg Dialect." He died in Nuremberg, March 8, 1809.

Gruber, Johann Gottfried (grö'ber), a German author; born in Naumburg, on the Saale, Nov. 29, 1774; studied at Leipsic, and in 1811 was appointed Professor at the University of Wittenberg, and in 1815 Professor of Philosophy at Halle. His chief work was that of editing, first with Ersch, and after his death, alone the first section of the "Universal Encyclopædia." His independent works include: "Herder's Characteristic" (1805); "History of the Human Race" (1805), and lives of "Wieland" (1815–1816), and "Klopstock" (1832); he also edited "Wieland's Complete Works" (1818–1828). He died Aug. 7, 1851.

Grub Street, a street near Moorfields, London (now Milton street), much frequented by cheap newspaper writers, though at various times not a few authors of ability resided there. Hence the term, "Grub Street," passed into colloquial usage to designate a literary hack or a worthless production.

Grün, Anastasius (grün), pseudonym of ANTON ALEXANDER, Count of Auersperg;

an Austrian poet; born in Laibach, April 11, 1806. Though of aristocratic birth and breeding, his political leanings were liberal, and he became immersed in the progressive movement of his day. His literary work, for the most part, grew out of and developed his public policy. His first volume, "Leaves of Love," did not attract much attention. "The Last Knight" was more successful; it celebrated the chivalry of the first Maximilian's time. "Strolls of a Viennese Poet," and a second volume of "Poems" made him known. "The Nibelungen in a Dress Coat" is a humorous narrative; "Robin Hood" is a powerful poem in ballad form; "The Kalenberg Pastor" is a picture of simple life; and "Popular Songs of the Krains" forms a very important collection of native folklore. He died in Gratz, Sept. 12, 1876.

Grundtvig, Nikolai Frederik Severin (grönt'vig), a Danish poet; born in Udby, Zealand, Sept. 8, 1783. He first became known as the author of "Northern Mythology" (1808); and "Decline of the Heroic Age in the North" (1809). These were followed in 1814 by the "Rhyme of Roeskilde" and the "Roeskilde Saga," and in 1815 by a collection of patriotic songs. His religious views got firm hold of the hearts of the people throughout the three countries of Scandinavia. Besides this he was instrumental in raising the educational condition of the peasantry. In 1825 Grundtvig, for an attack on one of the chief representatives of the prevalent rationalism, was fined and suspended from preaching, the suspension lasting till 1832. In 1818 he had begun the translation into Danish of "Snorri Sturluson" and "Saxo Grammaticus"; and in 1820 he published a Danish translation of the Anglo-Saxon poem "Beowulf." From 1839 Grundtvig preached in the church of Vartov Hospital in Copenhagen, after 1861 with the title of bishop, though he held no see. The works of his later years include "The Seven Stars of Christendom" (1860), and "Church Mirror" (1871), a collection of addresses. He died in Copenhagen, Sept. 2, 1872.

Grundy, Sydney, an English author; born in Manchester, March 23, 1848; was called to the bar. In 1876 he published "The Days of His Vanity"; but has since become known as a successful playwright, having produced "The Glass of Fashion" (1883); "A Fool's Paradise" (1890); "A White Lie" (1893); "Sowing the Wind" (1893); and "The New Woman" (1894).

Gruppe, Otto Friedrich (gröp'pe), a German author; born in Dantzig, April 15, 1804; graduated at Berlin, and after some experiences in journalism and public office, he became a professor at his alma mater. He first won attention with his "Antæus," a work on speculative philosophy, written in opposition to Hegelianism. "The Turning Point of Nineteenth-Century Philosophy," "Ariadne, the Tragic Art of the Greeks," "Roman Elegy," "The Theogony of Hesiod," and a variety of similar works have earned him distinction. His poems include: "The Winds," an effort at Aristophanean comedy; "Queen Bertha," "Emperor Charles," and "Albion," three epics of great beauty; "Poems of Fatherland," "The War of 1866," and other martial poems; "Otto von Wittelsbach," a drama. He died in Berlin, Jan. 7, 1876.

Grus, the Crane, one of the 12 S. constellations which were added to Ptolemy's original 48 by the early navigators to the S. hemisphere about the 15th century. Its two brightest stars, Alpha and Beta Grus, are of the second magnitude. The constellation is surrounded by Tucana, Indus, Microscopium, Piscis Austrinus, Sculptor, and Phœnix.

Gryphius, Andreas (grē'fē-ös), a German poet; born in Glogau, Silesia, Oct. 11, 1616; was left a comfortable legacy by a nobleman for whom he had been tutor; he traveled, and published his poems. "Leo Armenius," "Catherine of Georgia," "The Murdered Royalty; or Charles Stuart," are powerful but somber tragedies. Among his performances was "Peter Squenz," an adaptation from a garbled transcript of Shakespeare's "Midsummer Night's Dream." He died in Glogau, July 16, 1664.

Grysboc, or **Grysbok** (griz-), a South African antelope. It has straight, upright, pointed, shining horns, with two or three small annuli at the roots. On the upper parts the hair is red mixed with white, below it is sandy-brown or red, and on some there is black about the head. Length of the animal, nearly three feet. It is found in South Africa, goes in pairs, not in herds, and furnishes excellent venison.

Guadagnoli, Antonio (gwa"dän-yō'lē), an Italian poet; born in Arezzo in 1798. His poems, "The Nose," "Prattle," "My Clothes," and "A Woman's Tongue Put to the Test," display a lively wit with no malicious ingredient. His "Collection of Light Poetry" is much quoted. He died in Cortona, Feb. 21, 1858.

Guadalajara (gwä"dä-lä-hä'rä), a town of Guadalajara province, Spain; on the Henares, 35 miles N. E. of Madrid. It has manufactures of flannel and serge, and a royal college of engineering. Here is the quaint, neglected palace of the Mendozas, whose tombs, in the "Panteon" below the chapel of San Francisco, were barbarously mutilated by the French.

Guadalajara, city and capital of the State of Jalisco, Mexico, and the third city

of the republic; in a valley by the Rio Grande de Santiago, here crossed by a fine bridge of 26 arches, 280 miles W. N. W. of Mexico city, with which the place is connected by rail. Though most of the houses are of only one story, the town presents a pleasing appearance, with wide streets crossing at right angles, numerous public squares, and a fine shaded "alameda"; there are several lines of tramway, and water is supplied by an aqueduct over 20 miles long. Guadalajara is the seat of an archbishop, and possesses a handsome cathedral, besides the government palace, a mint, university, hospitals, and school of art. Its industries are important; it is the chief seat of the cotton and woolen manufactures of the country, and the Guadalajara pottery and metal wares, like the confectionery, have a reputation all over Mexico. Pop. (1900) 101,208.

Guadalcazarite (-zär'īt), a mineral, essentially a seleno-sulphide of mercury and zinc. It is represented by the formula $6HgS + ZnS$. It occurs massive and cryptocrystalline, and is of a deep black color. Though resembling cinnabar in composition, it is quite different in its physical properties, having a bluish-black streak and a greasy, metallic luster.

Guadalaquivir (gwä-THäl-kē-ver'), a river, known to the ancients by the name "Baetis," rises in the Sierra de Cazorla, Spain, on the borders of Jaen and Murcia, 15 miles E. S. E. of Ubeda, and passes Andejar, Cordova, Seville, and San Lucar-de-Barameda. The Guadalaquivir receives on the right the Guadalimar, Campana, Guadamelleto, Guadabarbon, Guadiato, and Biar; on the left, the lesser Guadiana, Guadalentin, Jaen, Guadajoz, Xenil, and Corbones. It falls into the Atlantic at San Lucar, after a winding course of about 250 miles.

Guadalupe (gâ-dä-löp'), a river rising among the mountains in Kerr co., Tex.; flows a general E. and S. E. course through Blanco, Comal, Guada, Gonzales, De Witt, and Victoria counties, and enters Espiritu Santo Bay between Calhoun and Refugio counties

Guadalupe-Hidalgo (gwä-THä-lö'pā-ē-däl'gō), a village of the federal district in Mexico, at the foot of Guadalupe mountain; 5 miles N. of Mexico city. It has a famous brick cathedral, the richest in all Mexico. Here is preserved a miraculous picture of a brown Virgin, painted on a peasant's coarse cloak. The treaty which ended the war with the United States was signed here, Feb. 2, 1848.

Guadeloupe (gwäd-löp'), one of the Lesser Antilles; a French colony. It is divided into two distinct parts by a narrow arm of the sea called Rivière Salée. The larger portion, or Guadeloupe proper, has an area of about 305 square miles, and is of volcanic origin. A ridge of hills traverses it N. and S., the highest points of which are La Soufrière, an active volcano, about 5,108 feet in height, and the extinct volcanoes La Grosse-Montagne, Les Deux Mamelles, and Le Piton-de-Bouillant. The other portion, Grand-terre, has an area of about 300 square miles, and is generally low, never rising to more than 115 feet above the sea-level. The principal exports are sugar, coffee, dye, and cabinet woods, tafia, hides, copper, etc. The principal town, St. Louis, or Point-a-Pitre, was destroyed by an earthquake in February, 1843. Guadeloupe was discovered by Columbus in 1493, and named by him Santa Maria de la Guadeloupe. In 1635 it was taken by the French, who held it till 1759, when the English gained possession of it, after which it changed owners several times, till the peace of 1814 restored it to the French. Pop. (1901) 182,112.

Guaiacic (gwī-yas'ik) **Acid,** in chemistry, guaiaretic acid, $C_{20}H_{26}O_4$. It is obtained by boiling powdered guaiacum resin with milk of lime for half an hour, filtering and extracting the residue with hot alcohol, distilling off the alcohol, and dissolving the acid in caustic soda, decomposing the crystallized sodium salt with hydrochloric acid, and recrystallizing from glacial acetic acid. Guaiacic acid is thus obtained in colorless needles, which melt at 80°. They are soluble in alcohol, and the solution gives a grass-green color with ferric chloride. It forms crystalline salts.

Guaiacol (gwī'ya-kol), in chemistry, methyl ether of pyrocatechin. Obtained by the dry distillation of guaiacum resin. It is also found in wood tar creosote. It is also formed by the dry distillation of calcium vanillate with slaked lime; and by heating to 170° equal molecules of pyrocatechin, caustic potash, and methyl potassium sulphate. Guaiacol is a pleasant-smelling aromatic oil, boiling at 200°. When heated with hydriodic acid, it is decomposed into methyl iodide and pyrocatechin. When heated with zinc dust, it yields anisol, $C_6H_5 \cdot OCH_3$. Its alcoholic solution gives an emerald-green color, with ferric chloride. It unites with alkalies.

Guaiaconic Acid, an acid contained in the mother liquid obtained in the preparation of guaiacic acid. The liquid is evaporated to dryness, and the residue treated with boiling alcohol, evaporated, and separated from the resin by means of ether. Guaiaconic acid is amorphous, melting at 100°, and is insoluble in water. It is easily soluble in alcohol, ether, chloroform,

and in acetic acid. It is turned blue by oxidizing agents. The calcium and lead salts are insoluble in alcohol. Symbol $C_{19}H_{20}O_5$.

Guaiacum, a genus of *Zygophyllaceæ*, tribe *Zygophylleæ*. Calyx of five unequal segments; petals 5-stalked; stamens 10; fruit, a 5-angled, 5-celled capsule, sometimes by abortion 2 or 3-celled. *Guaiacum officinale* is an ornamental tree with blue flowers, growing in Jamaica. The wood furnishes *Lignum vitæ;* its resin is called gum guaiacum. The leaves of *G. sanctum* are used in the West Indies as a substitute for soap. The bark and wood of both species are used as sudorifics, diaphoretics, or alteratives.

Guaiacum Resin, a reddish brown resin, obtained from the wood of *Guaiacum officinale*. The resin dissolves in potash; and in concentrated sulphuric acid with a red color. A tincture of the resin is turned blue by oxidizing agents; as chromic acid, ferric chloride. Guaiacum resin, fused with caustic potash, yields protocatechuic acid.

Guaira (gwī′râ), **La,** the port of Caracas, Venezuela, on a narrow strip of land between the mountains and the Caribbean Sea. Efforts have been made to improve the harbor by the construction of a breakwater and wharves. The average value of the imports is almost $5,000,000, and that of the exports nearly as much.

Gualeguay (gwä-lā-gwī′), a town of Entre Rios, Argentine Republic, on the Gualeguay river, with a railway (7 miles) to Puerto Ruiz at its mouth. The town has a tannery, steam mills, and large slaughter houses and beef-salting establishments.

Gualeguaychú (-chö′), a town of Entre Rios, Argentine Republic, on the Gualeguaychú river. Besides slaughtering and salting works, it has an extract of beef factory.

Gualtieri, Luigi (gwäl″tē-ā′rē), an Italian novelist; born in Bologna in 1826. At 22 he settled in Milan and married the popular actress Giacinta Pezzana, whom he has since accompanied on her professional tours. His first novel was "The Mysteries of Italy," followed by "The Anonymous," "The Serpent of the Visconti," "Recollections of Ugo Bassi," "God and Man," and "The Last Pope," together with many others, all of which became popular. For the stage he has written: "The Duel"; "The Love of an Hour"; "Aspects of Marriage"; "Heidelberg Students" and others.

Guam (gwäm), an island in the Pacific Ocean, the largest of the Marianne or Ladrone group; area, 200 square miles; capital, Agana. The island is fertile and to a great extent covered with valuable timber lands. There are 18 schools and about 90 per cent. of the natives can read and write. At the beginning of the American-Spanish War the Ladrone group belonged to Spain, and on June 20, 1898, the United States cruiser "Charleston," on its way to Manila, opened fire on Agana. The Spanish garrison, not knowing that war existed, and thinking the attack was a salute, sent an officer to the "Charleston" apologizing for not returning it, owing to lack of ammunition. When they learned the state of affairs, the place was surrendered in less than 30 minutes. Captain Leary, of the United States navy, was appointed the first American governor, and under his direction important reforms were instituted. Slavery was abolished, and in 1901 a breakwater and fortifications were under construction at the harbor of San Luis d'Apra, preparatory to establishing a coaling station there. Pop. about 9,000. See AGANA.

Guan (gö′an), or **Yacou** (yä′kö), a subfamily of birds of the family *Cracidæ*, among the representatives in the New World of the grouse and pheasants in the Old. It is represented by 14 species distributed from Southern Texas through Mexico to Paraguay. The guans are graceful birds, with long tails, handsome, variegated plumage, bare, dilatable patches of skin on the throat, and naked spaces round the eyes. They live mostly on trees, descending to the ground in search of their food, which consists of fruits, berries, and insects. They are remarkable for their loud, frequent cries, from which the Spaniards call them squalling pheasants.

Guanaco. See HUANACA.

Guanajuato (gwä-nä-hwä′tō), a State of Mexico; area, 11,370 square miles. The greater part of the surface belongs to the lofty plateau of Anahuac, and is traversed by the Sierra de Gorda in the N, and the Sierra de Guanajuato (11,030 feet) in the center; the S. W. portion belongs to the fertile plain of Bajio. The riches of Guanajuato consist chiefly in its valuable mineral products; there are large numbers of gold, silver, lead, copper, and quicksilver mines worked. Stock-raising is of some importance, but agriculture is little pursued, although the soil yields most products of both the temperate and tropical zones; a noteworthy article of export is chillies. Large cotton and woolen factories have been established by foreigners. Pop. (1900) 1,065,317.

Guanajuato, city and capital of Guanajuato, Mexico, on both sides of a deep ravine, traversed by a mountain stream that in the rainy season is swelled to a foaming torrent. The streets are steep and tortuous, the houses frequently of four or even

five stories. The public buildings include a large government palace, a mint, barracks, a cathedral, several convents and colleges, an art school, and the Alhondiga, a public granary. It is a mining town; its handsomest private houses belong to the wealthy proprietors of mines, and it contains several amalgamation works, others lining the cañon for several miles. There are also blanket factories and cotton printing works, electric lights and telephones, Pop. (1900) 41,486.

Guanaxuato. See GUANAJUATO.

Guano (gwä′nō), a grayish white, yellowish, dark brown, or reddish substance, classed by Dana as a mineral, which he places among his anhydrous phosphates and sulphates. It is a bone phosphate of lime or osteolite with some impurities. Its luster on a fresh fracture is resinous; its structure often granular or oölitic. Found in islands off the Peruvian and other South American coasts, also in those off the coast of Africa and elsewhere. Guano from different localities has been differently named. It has been called pyroclasite, pyroguanite, sombrerite, and glaubapatite. Guano is formed by the droppings of multitudinous birds in secluded places where they have been undisturbed for ages. If, in any locality, little rain falls, this tends to the rapid accumulation of guano.

Guantanamo (gwä-tä-nä′mō) **Bay,** a harbor of Southern Cuba, 38 miles E. of Santiago. To the right of the entrance is a range of rocky hills; on the left the shore is low and swampy. It was just outside of this bay that United States war vessels, during the early part of the war with Spain, tried to cut the cables which extended from Santiago to Guantanamo and thence to Spain. On May 18, 1898, the "St. Louis" and the tug "Wampatuck" endeavored to get into the mouth of the harbor, but the Spanish batteries and a gunboat in the bay opened up such a severe fire that the "Wampatuck" was forced to withdraw, after grappling a cable about 800 yards from the shore. On June 10, the United States cruiser "Marblehead" shelled the hills on the right of the bay where the enemy had erected earthworks, and the next day the transport "Panther" landed 600 marines at CAIMANERA, (*q. v.*). In 1903, Guantanamo Bay and adjacent territory were formally occupied by the United States government for one of the projected naval stations on the Cuban coast.

Guaporé (gwä-pō-rā′), a river of South America, rises in Brazil, and for some distance forms the boundary between Bolivia and Brazil. It unites with the Mamore to form the Madeira.

Guaracha (gwä-rä′cha), a lively Spanish dance in three-eighths or three-quarter time, usually accompanied on the guitar by the dancer himself.

Guard, a term applied to a military troop especially attached to the person of a sovereign, or chief ruler of a state. Bodyguards have been an inseparable accompaniment of monarchy from the earliest ages; the Assyrian and Persian kings employed them, and the corps of "Argyraspides," or "silver-shields," were selected by Alexander out of the bravest men of his army. The Roman emperors had their Prætorian guard. Napolon I. first created a small troop of body guards, with the title of Guides, while he was yet only general, in his first Italian campaign. From this arose by degrees the great institution of the Imperial Guard, consolidated in 1804, which 10 years later comprised 102,708 men, and after being disbanded by Louis XVIII. in 1815, was restored by Napoleon III. in 1854. It consists of infantry, cavalry, and artillery. In England, the Guards, otherwise called household troops, consist of two regiments of Life Guards, the royal regiment of Horse Guards, and three regiments of Foot Guards. Many of the European sovereigns before the French Revolution had small corps of foreign troops which served in this capacity. Thus the French had, in former times, the Guard of Scottish Archers, and at a later period, a body of Swiss guards, called the Cent Suisses. The Cent Gardes formed by Napoleon III. are founded upon the latter. The Pope still retains his Swiss guards. In Prussia there is both infantry and cavalry of the guard, and the Russian imperial guard forms an entire corps d'armée, 50,000 strong.

Guardafui (gwär-dä-fwē′) **Cape,** the extreme E. point of the African continent, and the extremity of an immense promontory, the Somali country, stretching seaward in an E. N. E. direction, and washed on the N. W. by the Gulf of Aden and on the S. E. by the Indian Ocean.

Guard Boat, a boat employed to row round and about ships of war in a harbor to see that a proper lookout is kept.

Guard Ship, a vessel of war stationed in a port or harbor to act as a guard, to see that the harbor regulations are observed, and to receive seamen until they can be draughted off to their respective ships. In the latter sense it is known in the United States as a receiving ship.

Guardian Angel, a pious belief but not an article of faith in the Latin and Greek Churches that to every individual of the human race there is assigned at birth an angel as guardian and protector. These duties are fulfilled by warding off tempta-

tions that may injure the person's spiritual condition, or by instilling into the soul wise counsels and holy warnings. Theologians deduce this belief immediately from Matt. xviii:10, and the fathers of the Church strongly inculcate it, and in the lives of the saints instances are given of the active interference of guardian angels. The belief is shared by Anglican High Churchmen. Bishop Bull speaks of the belief that every Christian has a guardian angel as "highly probable." Smith says that the notion of special guardian angels watching over individuals is consistent with the text in Matthew, though not necessarily to be deduced therefrom. He adds that the existence of the belief in the early Church is shown from Acts xii: 5. The Roman Church celebrates the Feast of Guardian Angels on October 2.

Guardian Spirit, the idea that each person is double, that when he dies his other self, whether remaining near at hand or gone far away, may return, and continue capable of injuring his enemies and aiding his friends. It finds expression in some form in all primitive religions, and in many which have reached a higher stage of development. The Australian native believes that when a warrior kills his first foe the spirit of the slain enters the body of the slayer, and becomes his guardian; in Tasmania a native has been heard to ascribe his deliverance from danger to the care of his deceased father's spirit; and the most important religious rite of a North American Indian is to obtain a patron genius. In Asia, in Africa, and among the Indians of South America, the belief in guardian spirits obtains, as it did formerly among the Aryans of Northern Europe. But it is in classic paganism that it appeals to us most gracefully. Menander tells us of the good mystagogue given to every man at his birth, and the dæmon of Socrates has quite a bibliography of his own, beginning with Plato and ending with Cardinal Manning. In Roman times the guardian spirit was represented as a lar among the household gods, and specially venerated on the anniversary of the birth of the guarded one, with festive rites. There are few more touching passages in Roman poetry than those in which Ovid describes his feelings in exile on the recurrence of the days sacred to his own and to his wife's guardian spirits.

Guarea (gwä′rē-ä), a genus of tropical American trees of the natural order *Meliaceæ*, of some of which the bark is used as an emetic and purgative. *G. grandifolia* is called musk wood in some of the islands of the West Indies, the bark smelling so strongly of musk that it may be used as a perfume. Although the tree attains timber size and has been employed for making rum hogsheads when other material was scarce, the wood contains a bitter resinous substance, the flavor and smell of which is communicated to the spirits to their detriment.

Guarini, Giovanni Battista (gwä-rē′-nē), an Italian poet; born in Ferrara, Dec. 10, 1537; studied at Pisa, Padua, and Ferrara, and was appointed to a chair at Ferrara. At the age of 30 he accepted service at the court of Ferrara, and was intrusted by Duke Alfonso II. with various diplomatic missions to the Pope, the emperor, Venice, and Poland. His chief and most popular work, "The Faithful Swain," obtained a high measure of popularity on its appearance, and passed through 40 editions in the author's lifetime, though it is really an imitation of Tasso's "Aminta." He died in Venice, Oct. 4, 1612.

Guarinite (gwär′-), a tetragonal, yellow, transparent or translucent mineral with a gray streak, having a somewhat adamantine luster, on the cleavage face. Hardness 6; specific gravity 3.5. Composition: Silica, 33.64; titanic acid, 33.92; lime, 28.01, etc. It is found in small cavities in a grayish trachyte on Mount Somma.

Guarino (gwä-rē′nō), an Italian writer; born in Verona in 1370, went to Constantinople in 1388 to learn Greek under Chrysoloras. After his return he taught in Verona, Padua, and Bologna, was tutor to Prince Lionella of Ferrara, acted as interpreter at the Council of Ferrara. He performed great services for the revival of classical studies; wrote Greek and Latin grammars; translated parts of Strabo and Plutarch; and helped to establish the text of Livy, Plautus, Catullus, and Pliny. He died in Ferrara, Dec. 4, 1460.

Guarneri (gwär-nā′rē), or **Guarnieri** (gwär-nē-ā′rē), the name of one of the three celebrated families of violin-makers who flourished at Cremona in the 17th and 18th centuries. The most notable of the family were ANDREA (1650–1695), a pupil of Niccolo Amati; his sons GIUSEPPE (1690–1730) and PIETRO (1690–1725); and his nephew GIUSEPPE, commonly called Giuseppe del Gesù.

Guatavita (gwä-tä-vē′tä), a village of the republic of Colombia, 20 miles N. E. of Bogota. Previous to the Spanish conquest it was a town of great importance, and on the banks of the Lake of Guatavita near it are the ruins of many once magnificent and venerated Peruvian temples.

Guatemala (gwä-tä-mä′lä), a republic of Central America, bounded by Mexico, Belize, Honduras, San Salvador, Gulf of Honduras, and the Pacific Ocean; area, 48,290 square miles; pop. (1907) 1,882,992, num-

ber of departments, 22; and capital, Guatemala la Nueva; pop. (1907) 125,000.

Topography.—The country is exceedingly mountainous and elevated, the main chain of the continuation of the Andes traversing it S. E. to N. W., and sending off numerous branches. Along the main chain are a number of volcanoes, among which are Fuego, over 12,000 feet high, which sends forth torrents of water, and Tajumulco, 14,403 feet high. The country is well watered by numerous streams, none of much importance. There are several lakes, the most important being Dulce, through which a great part of the foreign trade of the state is carried on, Amatitlan, Atitlan, and Peten.

Climate and Productions.— On the tableland, of which a considerable portion of the state is formed, the climate is mild; but in more elevated situations the cold is intense. There is much valuable timber. The soil generally is of great fertility, producing, according to altitude, soil, etc., maize, wheat, rice, coffee, cotton, tobacco, sugar, cochineal, cacao, indigo, vegetables, and tropical fruits in great variety. Fiber plants are numerous, including ramie, henequen, and others. In the altos or mountainous parts of the N. W. considerable flocks of sheep are raised, the wool of which is manufactured into coarse fabrics. The mineral resources are not much developed, but there are found gold, silver, lead, coal, talc, marble, pumice, and sulphur.

Commerce.— Official reports for 1898 showed imports of an aggregate value of $4,850,835 (in gold) and exports $15,377,460 (in silver). The imports, with values (in gold) were cotton, $583,608; flour, $422,833; wine, beer, spirits, etc., $261,838; iron, $169,888; gold and silver coin, $439,704; and silk goods, $106,808. The exports (in silver) were, coffee, $14,062,598; bananas, $93,246; and hides, $55,891. The foreign trade is carried on mostly with the United States, Germany, Great Britain, and France.

Finances.—The revenue for 1899 was $9,815,000, and the expenditure, $13,708,781 (in silver). The revenue is derived from the customs, monopolies, and various taxes, and the expenditures are mainly for finance, education, public works, and defense. The total silver debt, including railway and floating debts, aggregated $18,638,281 (silver) and the gold debt, exclusive of the external debt of $7,562,280, amounted to $1,203,205 (gold).

Communications.—In 1900 there was a line of railroad from San Jose to the capital (85 miles); one from Champerico to Retalhuleu (32 miles), and one from Retalhuleu to San Felipe. There were new lines of over 210 miles in length between Port Barrios and the capital, under construction, about half of which was completed and worked by an American firm receiving a government bonus of $40,000 per month. There are few good roads, most all transportation being carried on on muleback. In 1898 there were 825 vessels entered and 845 cleared at the various ports; 233 post-offices, transmitting 5,540,578 letters; and 3,126 miles of telegraph, with 148 officers, and transmitting 653,462 messages.

Government.—The executive power is vested in a president, elected for a term of 16 years, and ineligible for reëlection for the following term. The administration is carried on, under the president, by the heads of six departments, Foreign Affairs, Government and Justice, Hacienda and Public Credit, Public Instruction, Fomento, and War. The legislative authority is vested in a National Assembly consisting of one representative for every 20,000 inhabitants, chosen by universal suffrage for four years. The State recognizes no religious creed, all creeds having complete liberty of worship, the Roman Catholics predominating. Education is free and compulsory. In 1895 there were 1,266 government primary schools with an enrollment of 75,020 pupils, and an average attendance of 64,015. There were also 49 private primary and secondary schools, 6 institutes and normal schools, 9 institutions for special and 4 for professional instruction, and a polytechnic school, dependent upon the War Department. The government library contains 19,400 volumes.

History.— Ancient Guatemala was occupied by a race of Indians who had reached a high state of civilization at the time of the early Spanish invaders. It was conquered by Alvarado, a lieutenant of Cortez, and until 1824 was under Spanish rule, although independence was declared in 1821. Guatemala was a member of the Central American Confederation from 1824 to 1839, and several times since has attempted to bring all the Central American republics into a union, but without success, until 1897, when she signed a treaty of union with Costa Rica and the Greater Republic of Central America, which was, however, soon after dissolved. ANTONIO LAZO ARRIACA.

Guayaquil (gwī-ä-kēl′), a city and capital of Guayas province, Ecuador; in the valley of the Guayas, 30 miles above its mouth. Most of the houses are built of bamboo or wood and earth, and covered with creepers. The custom house is the most noteworthy of the public buildings, which include a cathedral and a townhall. In 1889 a statue to Bolivar was erected. The leading manufacturing establishments are combined steam sawmills, foundries, and machine shops; there are also ice factories and a lager beer brewery; and the place is

noted for its straw hats and hammocks. Ships drawing 18 feet can come up to the breakwater, and below the town there is a wharf, with a dry dock opposite. The annual exports average $6,500,000, of which cocoa represents nearly five-sixths; the other principal items are coffee, ivory-nuts, rubber, hides, and specie. The city has gas lights, street railways, and an improved waterworks system. It was founded by Orellana in 1537, and removed to its present site in 1693. Pop. about 80,000.

Guaymas, a well-sheltered port of Mexico, on the Gulf of California, the terminus of the Sonora railway (353 miles S. by W. of Benson, an Arizona station on the Southern Pacific railroad). It is a small place, excessively hot, surrounded by barren mountains, and mostly inhabited by Indian fishermen; but already it exports precious metals, wheat, flour, etc., in considerable quantities, and its trade is increasing.

Gubbio, the ancient Iguvium or Eugubium, a city of Central Italy, on the S. W. declivity of the Apennines, 20 miles N. N. E. of Perugia. It has a 13th century cathedral, several medieval palaces, the Brancaleoni with a valuable picture-gallery, and remains of an ancient theater. The celebrated Eugubine Tables are preserved in the town house. Gubbio was noted for its majolica ware, which was brought to perfection by Giorgio Andreoli in 1517–1537, by his delicate use of a beautiful ruby luster. Two celebrated yellow lusters were also used on Gubbio majolica.

Guben (gö'ben), a town and river-port in the province of Brandenburg, Prussia, at the head of the navigable portion of the Niesse, 28 miles S. of Frankfort-on-the-Oder. The town was destroyed by the Hussites in 1434 and 1437, and was twice occupied by the Swedes during the Thirty Years' War. Pop. (1905) 36,666.

Gubernatis, Angelo de (gö-ber-nä'tēs), an Italian author; born in Turin, April 7, 1840. His profound scholarship and versatility have won him distinction in widely separated departments of literature. "The First Twenty Hymns of the Rig-Veda" (1865); "Death of Cato" (1863), a drama in meter; "King Nala," an Indo-Brahmin play; "Gabriel," a novel; "Zoölogical Mythology" (1872); and many other works, evince a complete mastery of style, and exhibit his brilliant attainments. Literature is further indebted to him for his invaluable work of reference entitled "Writers of the Day."

Gudgeon, a small European fresh-water fish of the genus *Gubio*. It is about 6 to 8 inches long, and half-cylindrical in shape; its back is pale-brown, spotted with black, the belly white, and the tail forked. The gudgeon swims in shoals, and feeds on worms and aquatic insects. They afford great sport to anglers, from their greediness in seizing upon any bait presented to them.

Gudin, Theodore (gü-dan'), a French painter; born in Paris, Aug. 15, 1802; became a pupil of Girodet Trioson, and on leaving this artist confined his studies chiefly to marine and landscape painting. The picture which secured his fame was "The Salvage of the Passengers of Columbus," which was exhibited at the Salon in 1831, and is in the Bordeaux Museum. The "Storm in the Algerian Roadstead," in 1835, which was still more admired, is in the Luxembourg. When Louis Philippe resolved to decorate the interior of the palace of Versailles, he selected M. Gudin to paint the principal events in the naval history of France. The artist worked assiduously at this commission from 1838 till 1848, during which period he produced no less than 63 paintings, chiefly naval actions, many of large size. Among his pictures are "The Banks of the Don," "Coast-Scenes near Aberdeen," and "The Burning of Faubourg of Pera." His earlier pictures of coast scenery in France and Holland are considered his best. M. Gudin resided in Scotland after 1861. He died in Boulogne-sur-Seine, France, April 11, 1880.

Gudrun (gö-drön') or **Kudrun,** an old German epic, built up out of the popular songs and traditions of the seafaring folk who dwelt on the shores of the North Sea between Elbe and Seine. It relates the history of three generations of the kings of the Hegelings or Frisians, and in the third part tells how Gudrun, the daughter of Hettel, king of the Hegelings, was carried off from her home by Hochmut, son of the King of Normandy, how she preferred to work like the lowest maidservant in the house of Hochmut's mother, and endure the greatest indignities, rather than break her troth pledged to Herwig, King of Zealand, and how finally she was rescued by her brother and her betrothed. This poem, which has been entitled the German "Odyssey," as the "Nibelungenlied" is sometimes called the German "Iliad," was written, or rather arranged and edited, by an unknown poet in Austria, in all probability in the end of the 12th century.

Gueber, or **Gheber** (gē'ber), a term applied by the Mohammedan conquerors of Persia to the disciples of Zoroaster in that country. They call themselves "Behendies," followers of the true faith, and are generally known by Europeans as fire-worshipers. Zoroaster is believed to have flourished in the 6th century, B. C. In the course of time the system became very corrupted, and King Ardeshir Bakekan (A. D. 226) reformed it, collected the sacred

books, and caused them to be translated from the Zend language into the vernacular dialect of Persia, and built temples for the preservation of the sacred fire. See ZOROASTER and PARSEES.

Guelderland (gel'der-länt), or **Guelders** (gel'derz), a province of the Netherlands, between the Zuider Zee on the N. W. and the Prussian dominions on the S. E.; area, 1,965 square miles. It is watered chiefly by the Meuse, the Yssel, the Rhine, and the Wall. It was originally inhabited by the Batavi and Sigambri, and after them by the Franks. In 870 it passed to Germany; and in the end of the 11th century became a territorial power, its ruler bearing the title of count. This was exchanged for the higher title of duke in 1383, and in 1483 the duchy was taken possession of by Maximilian of Austria. Yet it was not till 1543 that the power of the Duke of Guelders was finally broken and his land definitely incorporated with the Austrian Netherlands. By the peace of 1814 Guelders was finally divided between Holland and Prussia. Pop. (1906) 612,478.

Guelf, or **Guelph** (gwelf), the name of a family which in the 11th century was transplanted from Italy to Germany, where it became the ruling race of several countries. The family still continues in the two lines of Brunswick, the royal in England, and the ducal in Germany. For their history, see GHIBELLINES.

Guell y Renté, José (gwely' ē rān-tā'), a Spanish author; born in Havana, Cuba, Sept. 14, 1818; studied law in Havana and Barcelona. A romantic attachment for Doña Josepha de Bourbon, sister of the king, ended in his marriage to her, in spite of tremendous court opposition, in 1848. He sided with the popular party in the revolution of 1854, and was subsequently elected to the Cortes. "Tears of the Heart" and "Heart-Chagrin" brought him into prominence as a poet. "Meditations, Christian, Philosophical, and Political, for the Use of the People," "Thoughts, Literary and Political," and many essays and political pamphlets, comprise his prose writings. He died in Madrid, Dec. 20, 1884.

Guell y Renté, Juan, a Cuban poet; born in Havana, in 1815. His first volume of poems was published in 1843; "Sentiments of the Soul," poems (1844); "Last Poems" (1859); and "Summer Nights" (1861). He died in Madrid, Spain, 1875.

Guelph, a city of Ontario, Canada, a port of entry, and the county-seat of Wellington co.; on the Speed river, and on the main line of the Grand Trunk railway and the Guelph and Goderich division of the Canadian Pacific railway; 48 miles W. by S. of Toronto. The leading business streets are Wyndham, McDonnell, Market square, and Quebec. The chief residential streets are Elva road, Woolwich, Glasgow, Park avenue, Norfolk, Queen, Suffolk, Waterloo avenue, Paisley, Oxford, and Liverpool. The most noteworthy buildings are the Ontario Agricultural College, Macdonald Institute, Carnegie Library, Homewood Sanitarium, court house, Royal Opera House, post office, and Provincial Winter Fair building. The city is adorned with several fine parks, including Riverside, Lyon, and Exhibition parks. Outside of the city limits is Victoria park with varied and attractive scenery. About 8 miles distant is the beautiful Puslinch Lake, about 300 acres in area. Guelph has several fine churches, including two Anglican, three Methodist, three Presbyterian, two Baptist, one Congregational, and one Roman Catholic. The principal educational institution, and one of the most famous of its kind in the world, is the Ontario Agricultural College and Experimental Farm, devoted to the education of young men in all branches of advanced agriculture. Macdonald Institute is for the education of young women in domestic science, nature studies, and manual training. The Rural Consolidated School gives similar instruction to boys and girls. These institutions, especially the first, are visited annually by more than 100,000 people. Other educational institutions are the Guelph Business College, Collegiate Institute, and Central Public School. There are two daily newspapers, the "Mercury" and the "Herald."

Business Interests. — The surrounding district is one of the best in Ontario for the raising of live stock. Grain, root, and fruit crops are abundant. Limestone is the only mineral found. A provincial winter fair is held here for a week annually. The leading manufactures are flour, beer, pianos and organs, sewing machines, cream separators, stoves, ranges, furnaces, furniture, carriages, iron pipes, water boilers and radiators, carpets, knit goods, etc. The value of the manufactured output for 1906, according to the Dominion census, was $4,814,925, as compared with $3,689,183 for 1901, an increase of 30.5 per cent. It is one of the leading Canadian cities in municipal ownership, the street railway, sewerage system, water works, and light and power plants all being the property of the municipality. The city also owns, but does not operate, the Guelph Junction railway, 15 miles long. In 1905 the city's assets were $1,350,678; liabilities, $1,118,868. The assessed value of real property in 1906 was $4,815,840. Guelph was founded by John Galt (*q. v.*), the Scottish novelist, about 1827. Pop. (1901) 11,496; est. (1907) 13,500.

Guelphic Order, an order of knighthood of Hanover, instituted by George IV., when Prince Regent, in 1815. It is both a military and civil order, and is unlimited in number.

Guercino da Cento. See BARBIERI, GIOVANNI FRANCESCO.

Guericke, Heinrich Ernst Ferdinand (ger'ik-e), a German theologian; born in Wettin, Feb. 25, 1803. He was professor at Halle, and author of a well-known "Handbook of Church History"; of a "Christian Symbolism"; and of a "Manual of Christian Archæology." He died in Halle, Feb. 4, 1878.

Guericke, Otto von, a German physicist; born in Magdeburg, Prussian Saxony, Nov. 20, 1602. His personal history contains nothing of interest. As a natural philosopher he is chiefly known by his experiments regarding the nature and effects of air, his discovery of the air-pump in 1650, and of the Magdeburg hemispheres. He made also some notable observations in electricity. He was for a time engineer in the Swedish army. He died in Hamburg, May 11, 1686.

Guerilla (ge-ril'la), an irregular mode of carrying on war by means of small, independent bands of armed men, self-constituted and ordered, unconnected with a regular army, and entitled to dismiss themselves at any time. Guerilla warfare is mainly carried on in a country occupied by an enemy.

Guérin, Baron Pierre Narcisse (gā-ran'), a French painter; born in Paris, May 13, 1774. A pupil of Regnault's, he first attracted notice by his "Marcus Sextus" (1799), the first of a series of classic subjects, skillfully treated, but showing something of melodramatic effect. After a visit to Rome and Italy in 1802, he settled in Paris. From 1822 to 1829 he was director of the French Academy of Painting in Rome. Among his pupils were Géricault, Delacroix, and Ary Scheffer. He died in Rome, July 6, 1833.

Guernsey (gern'zi), the second largest and most W. of the Channel Islands, lying off the N. coast of France, 46 miles from Cherbourg, and about 68 miles from Start Point in Devonshire. It is of a triangular form, about 9 miles long, and 3 to 4 miles broad. The N. part is level, the S. more elevated, coast lofty and abrupt, the island being almost entirely of granite formation. The climate is extremely healthy; snow is rare, and frosts light and of short continuance. The soil is fertile. The breeding of cattle and the dairy are the principal objects of attention; and the butter made is highly esteemed. Horticulture and floriculture also receive much attention, and fruit, especially figs and grapes, is very abundant. The grape-houses are further utilized for the raising of early vegetables and tomatoes, which are sent to the London market. The principal exports are cattle, fruits, vegetables in the early spring; granite for paving, etc. The dialect of the island is the pure Norman of some centuries ago; but a knowledge of English is general. The principal educational institution is Elizabeth College, at St. Peter's Port, the capital, and only town in the island. Steamers ply regularly between Guernsey and London, Southampton, Plymouth, and Weymouth. The island is under a lieutenant-governor, who represents the sovereign in the assembly of the States, a kind of local parliament. It is strongly fortified, and has a well-organized militia. Pop. (1901, including Herm and Jethou) 43,045.

Guernsey Lily, a plant, with purple red flowers, native of South Africa, family *Amaryllidaceæ,* so called from some of its bulbs being cast up in Guernsey from a wrecked ship, and there taking root. There are several other species also called Guernsey lilies.

Guernsey, Alfred Hudson, an American editor; born in Vermont, 1825. He was for several years editor of "Harper's Magazine" and associate editor of the "American Cyclopædia" (1872–1876). Together with Henry M. Alden he was author of "Harper's Pictorial History of the Great Rebellion," writing the Eastern campaigns (1862–1865); and "The Spanish Armada" (1882). He died Jan. 17, 1902.

Guéroult, Constant (gā-rö'), a French author; born in Elbeuf, Feb. 11, 1814; engaged in trade, he wrote novels in his leisure, and soon made his fortune. "The Stranglers of Paris," written partly in collaboration, is his representative effort; but "The Beggar of Toledo," "Captain Zamore," "The Depths of Paris," and "The Marcellange Affair" are powerful tales of the sensational order, and gave rise to a school of imitators. He died in Paris, Nov. 29, 1882.

Guerrazzi, Francesco Domenico (gwer-rät'sē), an Italian patriot; born in Leghorn, Aug. 12, 1804; educated for the legal profession; won a great reputation among his countrymen by his political fictions, which exercised an immense influence on contemporary Italian events by their exalted strain of patriotic enthusiasm. Guerrazzi's own words are, "he wrote a book when impotent to fight a battle." On the eve of the definite breach between the people and the Grand-duke of Tuscany in 1849, Guerrazzi was induced to accept office in the ministry. On the flight of the Grand-duke he was proclaimed member of the provisional government, and subsequently dictator. During this crisis of the state he energetically refused his adhesion to the substitution of republicanism for monarchy; and preserved the strict autonomy of Tuscany until the return of the grand-ducal rule. Then he was immediately seized and

imprisoned on the grounds of having neglected due measures of repression when the revolution first gathered strength during his ministry. His defense, entitled "An Apology for the Political Life of F. D. Guerrazzi" (1857), is a masterpiece. Restored to liberty and action by later events, Guerrazzi sat in the Parliament of Turin in 1862 and 1865. His chief works of fiction are "The Battle of Benevento" (1827); "Isabella Orsini" (1844); "Beatrice Cenci" (1854); "L'Asino" (1857). He died Sept. 23, 1873.

Guerrero (ger-rā′rō), a state of Mexico, on the Pacific Ocean; area, 24,996 square miles; capital, Chilpancingo. It is a broken mountainous country, rich in minerals, fertile in the upland valleys, and enjoying a favorable climate except on the coast. Pop. (1900) 474,594.

Guerrero, Teodoro, a Cuban dramatist; born in Havana in 1825. He was educated in Spain, returning to Cuba in 1845, in which year his first volume of poems was published. His comedy "The Head and the Heart" was successful, and "The Lesson of the World" reached many editions.

Guerrero, Vicente, a Mexican military officer; born in Tixtla, Mex., Aug. 10, 1783. At the commencement of the revolution in Mexico he took up arms against the Royalists, and never ceased to occupy a prominent position in the affairs of that country. On repeated occasions, from 1819 to 1828, General Guerrero became the rallying point of the liberal or popular party, the "Yorkinos," and was repeatedly called into active service in his military capacity. Having been successful in various contests with the aristocratic party, he at length, in 1829, was elected to the presidency. The expedition of Barradas soon gave employment to the new government; and the better to enable the president to meet the exigency, he was invested with extraordinary powers; but after the victory over the Spanish troops, and when the invading expedition was destroyed, Guerrero evinced an unwillingness to relinquish the dictatorship, which became the pretext of another revolution; and Bustamente, the vice-president, assumed the government. Guerrero, however, was not long idle; in September, 1830, he collected a large force at Valladolid, and established a form of government in opposition to that of Bustamente, and the whole country was agitated by troops in arms. He was captured and shot at Chilapa, Feb. 14, 1831.

Guesclin, Bertrand du (gā-klan′), Constable of France; born near Dinan in the district of Rennes, about either 1314 or 1320. From his boyhood upward he excelled in all martial exercises. In the contests between Charles de Blois and Jean de Montfort for the dukedom of Brittany he took part with the former, especially distinguishing himself at Vannes (1342). After King John had been taken prisoner by the Black Prince at the battle of Poitiers in 1356, Du Guesclin contended successfully against the English, his valor and military skill being especially shown at Rennes (1356) and Dinan (1357). Then, entering the service of the Dauphin, afterward Charles V., he took Melun (1359) and several other fortified towns, and freed the Seine from the English. On Charles's accession to the throne in 1364 Du Guesclin was created governor of Pontorson, and in May of the same year gained the battle of Cocherel against Charles the Bad of Navarre. But on Sept. 29 following he was defeated and taken prisoner by the English, under Sir John Chandos, at the battle of Auray, and only liberated on payment of a ransom of 100,000 livres. He next supported Henry, Count of Trastamare, against Pedro the Cruel, King of Castile, but was defeated and taken prisoner by the Black Prince near Najera (1367). Being again ransomed on payment of a large sum, Du Guesclin renewed the contest, and in 1369 defeated and captured Pedro at Montiel, and placed the crown of Castile on the head of Henry of Trastamare. Immediately afterward he was recalled by Charles V. of France, at that time hard pressed by the English, and was raised to the dignity of Constable of France. In the year 1370 Du Guesclin opened his campaigns against the English, and in a few years the whole of their possessions were in the hands of the French, with the exception of a few fortified towns. While assisting at the siege of Châteauneuf de Randon, in Languedoc, Du Guesclin was taken ill, and died July 13, 1380.

Guest, Edwin, an English archæologist; born in Worcestershire, England, in 1800; entered Caius College, Cambridge, in 1820. He published his well-known "History of English Rhythms" in 1838 — a work of great erudition, and written, moreover, before the era of good editions of old English poetry had begun. His frequent papers on the early history of Roman and Saxon England and the English were printed in the "Archæological Journal" and the "Transactions" of the "Archæological Journal" and the "Transactions" of the Archæological Institute and other learned institutions, and earned the praises of scholars so critical as Mr. Freeman. In 1852 Guest succeeded Dr. Chapman as Master of Caius College, Cambridge, and next year received the degree of LL. D. He became F. R. S. in 1841, and was vice-chancellor of the university in 1854. He died Nov. 26, 1880.

Guettarda (get-tär′dä), a genus of plants, order *Cinchonaceæ*. *G. speciosa*, a

native of the West Indies, is the tree from which the beautiful zebra wood of the cabinet-makers is obtained.

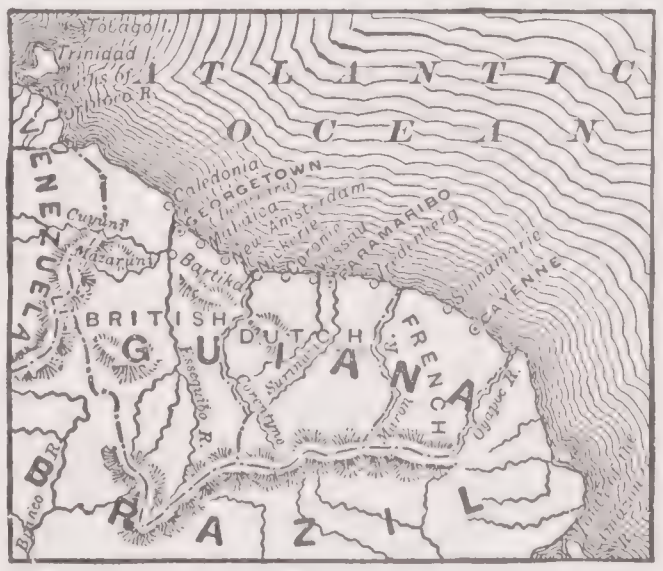
Gueux (ge), or "The Beggars," the name assumed by the confederated nobles who opposed the introduction of the Inquisition into the Low Countries by Philip II. of Spain. Forming themselves into an association, November, 1565, they presented a formal protest to the regent, Margaret of Parma, April 5, 1565. Their distinctive party name they adopted from an abusive epithet applied to them on that occasion by one of Margaret's courtiers. The "beggars," who represented the national feeling of the country, maintained a long and vigorous contest against the despotic proceedings of Philip and his advisers, but were ultimately compelled to succumb to superior force. A branch of them, "the Beggars of the Sea," under the leadership of the bold Count de la Marck, seriously harassed the Spanish fleet, captured transports with supplies for Alva's army, seized several fortresses, and succored besieged places along the coast. Their capture of Briel in April, 1572, was the beginning of the war which terminated in the independence of the Netherlands in 1648.

Guevara, Antonio de (gā-vä′rä), a Spanish essayist; born in Viscaya, about 1490. After a short career at court he became a Franciscan. Charles V. made him his companion in some of his voyages, and gave him a rich bishopric. His writings were an influence in the development of Spanish letters, being distinguished by a great purity of diction and a courtly and graceful style. His "Marcus Aurelius," for example, is a sort of "Cyropædia," and has been translated into many languages. "The Prince's Time-Piece" and "The First Ten Cæsars" are manuals for the ethical guidance of youthful royalty. He died in 1545.

Guevara y Dueñas, Luis Velez de (ē dwān′yäs), a Spanish dramatist; born in Ecija, Andalusia, January, 1570. As a young lawyer he won the favor of King Philip, who gave him his first literary encouragement. He wrote 400 plays, all very long and full of wit. "Empire After Death" and "The King is More Important than One's Own Flesh and Blood," are the best known. He also wrote a novel or romance, "The Lame Devil," from which Le Sage freely borrowed in writing upon the same theme. He died in Madrid, Nov. 10, 1646.

Guglielmi, Pietro (göl-yel′mē), an Italian composer; born in Massa di Carrara in May, 1727. His first opera, composed at the age of 28, was greeted with enthusiasm at Turin. He visited the chief cities of Italy, everywhere with success. After a residence of some months at Dresden and various other towns, Guglielmi went to London, where he remained five years. At the age of 50 he returned to Naples with the double prestige of great fame and wealth, and in 1793 Pope Pius VI. appointed him chapel master at St. Peter's. Among his most popular operas were "Dido"; "Eneas and Lavinia"; "The Two Twins"; "The Beloved Servant"; "The Noble Pastoral"; and "The Beautiful Fisher." He died Nov. 19, 1804.

Guiana (gē-ä′nä), **British,** a British colony in the N. E. part of South America; bounded by Dutch Guiana, Brazil, Venezuela, and the Atlantic Ocean; area, 104,000 square miles; capital, Georgetown. The surface of the country is diversified with low savannahs near the coast and mountainous toward the S., the highest mountain being Mt. Roraima, 7,500 feet. The chief products are gold, sugar, molasses, balata, rum, and rice. There are railroads, steamship communications with



Great Britain and telegraph and telephone systems. Columbus is said to have discovered the Guianas in 1498. The Dutch made settlements in 1650 and the English in 1630. In 1804 the Guianas were divided between the English, French, and Dutch, as they now stand. In 1895 there was trouble between Great Britain and Venezuela concerning the Guiana boundary. Pop. (1901) 304,549. See VENEZUELA.

Guiana, Dutch, or **Surinam,** a colony of the Netherlands in the N. E. part of South America; bounded by Brazil, British Guiana, French Guiana, and the Atlantic Ocean; area, 46,060 square miles; capital, Paramaribo. The surface is low along the coast, gradually increasing in elevation toward the mountains in the S. The principal products and exports are sugar, cocoa, bananas, coffee, rice, maize, rum, molasses, and gold. There are public schools, savings banks, and steamship lines. In 1667 Dutch Guiana was ceded to The Netherlands by Great Britain in exchange for New Neth-

erlands. It was held by the British in 1799–1802, and again in 1804–1816, when it was returned to The Netherlands with several other Dutch colonies. Pop. (1904) about 74,578, exclusive of negroes in forests.

Guiana, French, a French colony and penal settlement in South America; bounded by Dutch Guiana on the W., Brazil on the E. and S., and the Atlantic Ocean on the N.; area, 30,500 square miles; pop. (1901) 32,908, of whom 4,097 were convicts; capital, Cayenne (pop. 12,612), on an island of the same name. The territory does not differ materially from the other Guianas. Cayenne was first settled by the French in 1604; was captured by the British and Portuguese in 1609; and was restored to France in 1614.

Guicciardini, Francesco (gwē-chär-dē'-nē), an Italian historian; born in Florence, March 6, 1482. He studied law and literature; became papal ruler successively at Modena, Reggio, Parma, Romagna, and Bologna; secured the election of Cosmo de' Medici as Duke of Florence; and, being disappointed in his ambitions, withdrew to Arcetri, and busied himself with the composition of an analytical history of Italy between 1494 and 1532. He died in Arcetri, in May, 1540.

Guicowar (gē'kō-wär), the designation of a powerful Mahratta prince, ruler of the State of Baroda in Gujarat. Piláji, who became Guicowar in 1721, by predatory excursions gradually acquired authority over Gujarat; and his son Damáji ultimately threw off his allegiance to the Peishwa. Malhar Rao, installed in 1871, was in 1873 accused of attempting to poison the British Resident, tried, and deposed.

Guides (gēd) **Les,** a corps of the French army, formed in 1774. They were made by Napoleon I. into a guard. When, in 1860, Savoy and Nice were annexed by France in compensation for aid rendered to Italy in the war with Austria, it was a party of Guides who placed the French flag on the summit of Mont Blanc to the shouts of "Vive l'Empereur!"

Guido Aretinus (gwē'dō a-ri-tī'nus), or **Guy of Arezzo** (ä-ret'sō), a French musician; born near Paris in 990; went to Arezzo as a Benedictine monk. He greatly influenced musical studies, and almost every discovery made in music for 150 years has been attributed to him including that of descant, counterpoint, and the spinet. It seems, however, that it was he who first adopted as names for the notes of the scale the initial syllables, set to regularly ascending tones, of the hemistichs of a hymn in honor of St. John the Baptist. He is said to have invented the principle on which the construction of the stave is based, and the hexachord, solmisation, and the "Harmonic or Guidonian Hand," a mnemonic method of indicating the order of the musical sounds on the finger-joints of the left hand. The fame of Guido's musical invention drew upon him the attention of the Popes Benedict VIII. and John XIX., who invited him to Rome. Guido left writings explanatory of his musical doctrines, especially the "Micrologus" and the "Antiphonarium." He died in Avellana in 1050.

Guido Reni, an Italian painter; born in Calvenzano, Nov. 4, 1575. He studied under Calvaert, and entered the school of the Caracci, of which he and Domenichino were the most famous pupils. His earliest works, of which the "Coronation of the Virgin," in the National Gallery, London, is an example, are marred by rather harsh and violent coloring; but coming under the influence of Caravaggio, he adopted many of the qualities of his art, and his following works are characterized by forcible if exaggerated chiaroscuro. About 1596 he settled in Rome, where he worked for some 20 years, adopting a graceful style, of which the famous "Aurora and the Hours," painted on the ceiling of the pavilion of the Rospigliosi Palace, is a typical example, as is also the "Nativity," in the choir of San Martino at Naples. On account of a quarrel with Cardinal Spinola regarding an altarpiece commissioned for St. Peter's he left Rome and settled at Bologna, where he died Aug. 18, 1642.

Guidon (gē-dôn'), a swallow-tailed company flag in a cavalry regiment, half red and half white, dividing at the fork. The red above has "U. S." in white. The white is below, and has the letter of the company in red. The fly is 3 feet 5 inches to the end of the tail; the head is 27 inches. The lance is 9 feet long, including spear and ferrule.

Guido y Spano, Carlos (gwē-dō ē spä'nō), an Argentine poet; born in Salta, March 8, 1832. He was graduated at the University of San Carlos, Buenos Ayres; practised law; was elected deputy to the National Congress, and became its president. He gained reputation as a poet, and is held in highest esteem by his countrymen. His poems are gathered in the volume entitled "Leaves in the Wind," published in 1871.

Guienne (gē-en'), one of the old French provinces, comprehending the present departments of Gironde, Lot, Dordogne, Aveyron, with portions of Tarn-et-Garonne and Lot-et-Garonne. It formed with Gascony what was originally the country of Aquitania, of which name Guienne is a corruption.

Guignes, Joseph de (gēny'), a French Orientalist; born in Pontoise, Oct. 19, 1721; acquired a great reputation as an Orientalist, and, chiefly on account of his thorough

knowledge of Chinese, was appointed interpreter of Oriental languages in the Royal Library. His great work, "The General History of the Huns, Turks, Mongols, and Other Occidental Tartars" (1756–1758), is a rare example of industry and research. He died in Paris, March 19, 1800.

Guild, a society or body of individuals associated together for carrying on commerce, or some particular trade or business. There existed at Rome various fraternities of tradesmen, which bore a considerable resemblance to our modern guild, and were permitted to regulate their affairs by their own laws; but it is usual to trace the origin of guilds to the Middle Ages. As soon as the citizens acquired an influence in the administration, the guilds became the basis of the municipal constitutions, and every one who wished to participate in the municipal government was obliged to become a member of a guild. Hence we so often find distinguished individuals belonging to a class of mechanics of whose occupation they probably did not know anything. Guilds introduced the democratic element into society, and in their progress became the bulwarks of the citizen's liberty and the depositaries of much political power. By the close of the 12th century merchants' guilds were general throughout the cities of Europe. The Drapers' Company of Hamburg dates from 1153, and that of the Shoemakers of Magdeburg from 1157. With the increase of their wealth and strength, the guilds either purchased or extorted from their rulers privileges which, once obtained, they were careful never to give up. By the 13th century they had acquired considerable power, and in two successive ages they counterbalanced the power of the nobles.

Guild, Curtis, an American author; born in Massachusetts in 1828. He was the editor of the Boston "Commercial Bulletin," which he founded in 1859, and was the author of several popular books of travel. Among his works are: "Over the Ocean" (1871); "Abroad Again" (1877); "Britons and Muscovites" (1888); "A Chat About Celebrities."

Guild, Reuben Aldridge, an American author; born in West Dedham, Mass., May 4, 1822. His published works include: "History of Brown University With Illustrative Documents" (1867); "Chaplain Smith and the Baptists" (1885). He edited "Rhode Island in the Continental Congress, 1765–1790," by William R. Staples (1870); "Letter of John Cotton, and Roger Williams' Reply" (1866); and "Queries of Highest Consideration," by Roger Williams (1867). He died in 1899.

Guildford (gil'fōrd), a town and county-seat of Surrey, England, in a break of the chalk ridge of the North Downs, on the navigable Wey, 30 miles S. W. of London. Its houses are still rich in quaint gables, projecting fronts, and long latticed windows. The square Norman keep of its royal castle is 70 feet high with walls 10 feet thick; on St. Catherine's Hill is a ruined chapel (1313); Trinity Hospital, founded in 1619 by Archbishop Abbot for 12 brethren and 8 sisters, is a picturesque red brick pile; and other buildings are the churches of St. Nicholas, St. Mary, and the Holy Trinity, the guildhall (1687), county hall (1862), county hospital (1868), and grammar school (1509–1550). Guildford is famous for its grain market, the "Surrey wheats" being celebrated. It was bequeathed in 901 by Alfred the Great to his nephew Ethelwald, and in 1036 was the scene of the decimation by King Harold's men of the Norman followers of Alfred the Atheling, a crime that led up to the Norman conquest of England. The Dauphin Louis took the castle in 1216; and in 1685 Monmouth was temporarily confined in Trinity Hospital. Pop. (1901) 15,938.

Guildhall, a building in London, the place of assembly of several courts, and the scene of the civic banquets of the city corporation; originally built in 1411, but almost wholly destroyed by the great fire of 1666. It was rebuilt in 1789 in its modern form.

Guilford College, a coeducational institution in Guilford, N. C.; founded in 1837 under the auspices of the Society of Friends, has grounds and buildings valued at over $130,000; endowment funds, $176,000; volumes in the library, about 5,000; scientific apparatus, etc., $17,500; ordinary income, about $55,000; average number of faculty, 12; average student attendance, 265.

Guilford Court-House, a village in Guilford co., N. C.; about 5 miles from Greensboro; noted for a battle fought between the Americans under General Greene, and the British under Lord Cornwallis, on March 15, 1781. The Americans numbered about 4,400 and the British 2,400. Both armies lost heavily, and the engagement was indecisive.

Guillaume de Machaut (mä-shō'), a French poet; born in Machaut, Seine-et-Marne, between 1282 and 1284. He first appeared in a menial office at the court of Jeanne of Navarre, wife of Philip the Fair; becoming the latter's valet in time, and subsequently clerk to the King of Bohemia. A lady of prominence at the French court — the wife of the Comte de Foix, according to some, Péronne d'Armentières, according to others — fell in love with him, and their amours are set forth in his "Voir Dit" or "Book of Said and Seen." "The Taking of Alexandria" narrates the ad-

ventures of King Peter I. of Cyprus. His musical compositions were much esteemed. He died in Rheims about 1377.

Guillemard, Francis Henry Hill, an English traveler; born in Eltham, Kent, in 1852. He is a graduate of Cambridge, and for some time taught there. He has traveled extensively and explored many unfrequented lands. Besides contributions to scientific, literary, and medical reviews, he has published "The Cruise of the Marchesa to Kamchatka and New Guinea" (1886), interesting alike to naturalist, traveler, and general reader.

Guillemin, Amadée Victor (giy-man'), a French scientist; born in Saône-et-Loire, July 5, 1826, and became a Professor of Mathematics at Paris. Of his numerous illustrated works many have been translated into English, including "The Heavens" (1866), "The Sun" (1869), "The World of Comets" (1876), and "The Forces of Nature" (1872), and "Application of Physical Forces" (1877), the last two by Mrs. Norman Lockyer. Both in France and England Guillemin's works passed through many editions. He died Jan. 2, 1893.

Guillemot (gil'le-mot), uria, a genus of natatorial birds placed under the family *Alcidæ*. The bill is moderate and slender, the frontal planes advancing far upon the nostrils, but divided by the culmen; the tail short, the wings pointed, the feet short, slender, and three-toed. The proper habitat of the guillemot is amid the rocks and ice-caverns of the Arctic Ocean. They deposit their solitary egg on a ledge of rock, and the young, when hatched, tumble into the sea and swim and dive with great facility, feeding on small fish and crustaceans.

In America *U. grylle* breeds as far S. as the Bay of Fundy; *U. troile* is occasionally found on the coasts of New York. Where guillemots congregate in vast numbers, as at Flamborough Head, scaling the cliffs in search of their eggs is a regular profession, and one which requires much skill and courage. The eggs are occasionally used as food, as is also, indeed, the coarse flesh of the bird itself; but they are chiefly valued for their albumen, of which it is said large quantities are employed in clarifying wine and in the preparation of patent leather.

Guillotine (gi-lo-tēn'), an apparatus for beheading persons at one stroke, adopted by the National Assembly of France during the first revolution, on the proposal of a Dr. Guillotin, after whom it is named. It was made by a German mechanic, named Schmidt, under the direction of Dr. Antoine Louis, secretary of the Academy of Surgery, and was at first called Louison, or Louisette. It was used the first time April 25, 1792, for the execution of a highwayman named Pelletier.

In this apparatus decapitation is effected by means of a steel blade loaded with a mass of lead, and sliding between two upright posts, grooved on their inner sides, the person's neck being confined in a circular opening between two planks, the upper one of which also slides up or down.

GUILLOTINE.

The condemned is strapped to a board, which rests horizontally on the table in front of the upright posts, but which is easily drawn forward and set upright when necessary, and again canted over upon the table and rapidly moved up so as to place the neck of the condemned within the semicircle of the lower plank, the other being raised for the purpose. On the right of the table is a large basket or trough of wickerwork for the reception of the body. Under the place where the head rests is an oblong trough for its reception. The knife is fixed to the cap or lintel on the top of the posts by a claw in the form of an 8, the lower part of which opens as the upper part closes. This claw is acted upon by a lever to which a cord is attached. When the head of the condemned is in position the cord is pulled, and by the action of the lever the knife is set at liberty, descending by the grooves in the upright posts and falling on the neck of the condemned just behind the planks which keep the head in position. The same name is given to a machine which cuts by a knife descending between grooved posts, much used for cutting paper, straw, etc.

Guilmant, Félix Alexandre (gēl-mon'), a French musician; born in Boulogne,

March 12, 1837; became, in 1860, a pupil of Lemmens, and was appointed organist of the Church of the Trinity in 1871. He is one of the foremost of French organists, and his organ works, among which are five sonatas, are of great interest and beauty.

Guinea (gin'i), the name of a large section of the W. coast of Africa, from the Senegal, in about 14° N. lat., to Cape Negro, in 16° S. lat. It is divided into two parts, Upper and Lower Guinea, the dividing line being taken variously as the equator, the Gaboon, and the Ogoway. The states and political territories comprised within this long stretch of coast-line, commencing from the N., are as follows: the French colony of Senegal, the English settlements on the Gambia, the Portuguese territory of Bissao or Bissajos, the coastal fringe before Futa-Jallon, Sierra Leone, the free negro republic of Liberia, the Ivory and Gold Coasts, the Slave Coast, the Niger delta, and the Kameruns in Upper Guinea; and in Lower Guinea, the Spanish settlements on Corisco Bay, Gaboon, the Kongo Free State, and the Portuguese territories of Ambriz, Angola, and Benguela. The coast-line is throughout tolerably uniform, and everywhere flat, with numerous shallow lagoons separated from the ocean by narrow spits of sand, lying parallel to the coast. Proceeding inland, the country rises to the central plateau of the continent by a series of broad terrace-like steps, down which the longer rivers are generally precipitated in cataracts and rapids. The Genoese claim to have been the first European navigators to reach, in 1291, the coasts of Guinea. They were, however, first regularly visited by merchant adventurers from Rouen and Dieppe from 1364 onward, but not colonized till the end of the 15th century, when the Portuguese, under the enterprising Prince Henry the Navigator, sent out, in 1481, the first colonies to this part of the world.

Guinea, a gold coin, formerly current in Great Britain. By a proclamation issued Dec. 22, 1717, the guinea was declared current at 21s. sterling. Its true value, as derived from the market values of gold and silver at that time was 20s.8d., about $4.96. At present there is no English coin so called, but the fashion still prevails of quoting prices of some things in guineas, and subscriptions are frequently recorded in the same denomination.

Guinea, Gulf of, that portion of the Atlantic which washes the shores of Upper Guinea, between Cape Palmas and Cape Lopez, and including the bights of Benin and Biafra. The islands of Fernando Po, Prince's, and St. Thomas, are within this gulf.

Guinea Coast. See GUINEA.

Guinea Fowl, a genus of African birds in the pheasant family. The plumage is dark gray, with round spots of white, generally larger on the back and under the surface. Some species are adorned on the head with a helmet or horny casque, while others have fleshy wattles on the cheeks and a tuft or top-knot on the crown. The genus is represented by nine species, in the Ethiopian region—E. to Madagascar, S. to Natal. The best known is the common guinea fowl or pintado (*N. meleagris*), also popularly known as "Come-back," from its cry, with naked head, hard callous casque, and slate-colored plumage, everywhere speckled with round white spots of various sizes. It is common in Guinea and S. to the Cape of Good Hope. It is found also in more N. parts of Africa, and was known to the ancient Romans, by whom it was called Meleagris and Gallina Numidica, and highly prized. In their wild state the birds occur in flocks, sometimes of 50 to 60, and are extremely shy and difficult to approach. They utter a frequent, harsh, and querulous cry. They are not so polygamous as many of the gallinaceous birds and even in domestication show a tendency to pair. The guinea fowl is now common in the poultry yards of most parts of the world, though it is more adapted to warm than to cold climates. The eggs are small, and have a thick, strong shell. The flesh is somewhat like a pheasant's, but rather dry.

Guinea Pig, the common name of the genus *Cavia*, family *Hystricidæ*. The common guinea pig, *C. cobaia*, is indigenous to South America, but is now found domesticated in all parts of the world. It has ears large and broad, the upper lip divided in two, the hair or fur erect, and somewhat resembling that of a pig. Its color is generally white, with black spots, although this is somewhat variegated by orange blotches on the coat. It has five toes on the fore legs, and three on the hind ones and has no tail. In their habits guinea pigs are extremely neat, as they are constantly seen smoothing and arranging the hair which forms the outer tegument of their coat. The guinea pig in its wild state inhabits dry sandy places, and its flesh is considered a great dainty by the natives of South America.

Guinegate (gēn-gät'), a village of Hainault, Belgium; the scene of two French defeats. On Aug. 17, 1479, they were beaten by Maximilian I. of Austria; and on Aug. 16, 1513, by Henry VIII. and the Emperor Maximilian. This battle was called the Battle of the Spurs, the French knights having made more use of their spurs than of their swords.

Guines (gēn), formerly **Guisnes,** a small town in France, 8 miles S. of Calais;

the scene of "the Field of the Cloth of Gold."

Guiney, Louise Imogen (gī'ni), an American poet; born in Boston, Jan. 7, 1861. Among her volumes of verse may be mentioned: "Verse"; "Songs at the Start"; "A Roadside Harp"; "Martyr's Idyl"; etc. She has also published: "Goose-Quill Papers"; "Brownies and Bogles"; "Monsieur Henri"; "A Little English Gallery"; "Lovers' Saint Ruths"; "Patrins"; "The Secret of Fougereuse"; etc. She has edited an edition of Mangan's poems.

Guinicelli, Guido (gwē-nē-chel'lē), an Italian poet; born in Bologna about 1240; held a judgeship in Bologna till expelled for political reasons. His importance is due to his great influence upon Dante, who pronounced him a model of grace and style, and apostrophized him in the "Inferno." The poems comprise seven canzone or songs in the style of the ode, and five sonnets, all dealing with love, and characterized more by feeling and beauty of sentiment than by power. He died in exile in 1276.

Guinness, Mrs. Fanny E. (gin'nes), an English evangelist; wife of Henry Grattan Guinness; born in Dublin, Ireland, April, 1831. She was one of the earliest woman preachers of the gospel, and was secretary of the first Christian mission on the Kongo. Besides works written in collaboration with her husband, she published; "She Spake of Him: Being Recollections of Mrs. H. Denning" (1872); "Sitwana's Story" (1882); "The Wide World and Our Work" (1886); "New World of Central Africa."

Guinness, Henry Grattan, an Irish evangelist; born near Dublin, August, 1835. His chief work, "The Approaching End of the Age," was issued in 1878. He has also written: "Preaching for the Million" (1859); and with his wife: "Light for the Last Days" (1886); "Romanism and the Reformation" (1887); "The Divine Programme of the World's History" (1888).

Guinness, Sir Benjamin Lee, an Irish philanthropist; born Nov. 1, 1798. He was a member of the great Dublin brewing firm; member of Parliament 1865–1868; and restored at his own expense ($700,000), the Cathedral of St. Patrick in Dublin. He died May 19, 1868.

Guinness, Sir Edward Cecil, son of the preceding; born Nov. 10, 1847; placed in trust the sum of $1,250,000, for the purpose of erecting sanitary dwellings for working people at a low rent. Of this sum $1,000,000 was to be given to London, and the remainder to Dublin.

Guiraud, Baron Alexandre (gē-rō'), a French poet; born in Limoux, Dec. 25, 1788; took up literary pursuits in Paris, writing poems, plays, and miscellaneous prose. "The Maccabees," a tragedy, was his first unqualified success. His ode addressed to the Greeks had attracted some notice; and he now brought out a volume of "Songs of a Savoyard," which attained great popularity, especially "The Little Savoyard." He wrote several other dramas, and a romance or two. He died in Paris, Feb. 24, 1847.

Guisborough (giz'bur-ō), a town of the North Riding of Yorkshire, England, at the foot of the Cleveland Hills, in the midst of the iron mining district, 9 miles E. S. E. of Middlesborough. The earliest alum works in England were established here about the year 1600. Here too are the remains of a priory built in 1119 by Robert de Brus, and at the time of the Reformation one of the wealthiest monastic institutions in the kingdom.

Guiscard, Robert (gēs-kär'), Duke of Apulia and Calabria; born near Coutances, Normandy, about 1015; won great renown in South Italy as a soldier, and after the death of William and Humphrey was proclaimed Count of Apulia. Guiscard next captured Reggio and Cosenza (1060), and thus conquered Calabria, in the possession of which he was confirmed by Pope Nicholas II. Robert now became the Pope's champion, and along with his younger brother Roger waged incessant war against Greeks and Saracens in South Italy and Sicily, both of which gradually fell under their arms, the latter being, however, given to Roger as count. The closing years of his life were occupied in fighting against Alexius Comnenus, who had deposed Michael VII. from the throne of Constantinople. He died in Cephalonia, July 17, 1085.

Guise (güez), a town of the department of Aisne, France, on the Oise, 25 miles E. N. E. of St. Quentin. Within the town are the ruins of a castle, from which the famous Dukes of Guise derived their title. The iron works are conducted on a profit-sharing scheme; and the workmen are provided with dwellings on the associated plan. This "Familistère," of which the first portion was erected by the initiator of the experiment, M. Godin, in 1859–1860, cost about $400,000, and provides accommodation for 2,000 persons. Within the buildings are a café, theater, nursery, schools, covered playgrounds, coöperative store, and a library and reading room. Pop. (1901) 7,310.

Guise, the name of a branch of the ducal family of Lorraine, which it derives from the town of Guise, in the department of Aisne.

Claude of Lorraine, first Duke of Guise, fifth son of René II., Duke of Lorraine; born at the château of Condé, Oct. 20, 1496. Attaching himself to Francis I., he

fought with distinction at Marignano in 1516; but after that campaign remained at home to defend France against the English and Germans (1522–1523). During the captivity of Francis I., after Pavia, Claude of Guise suppressed the peasant revolt in Lorraine (1527), for which Francis, after his return home, created him Duke of Guise. He died April 12, 1550.

His daughter, MARY OF LORRAINE, born Nov. 22, 1515; in 1538 became the wife of James V. of Scotland. By his death in 1542 she was left a widow with one child, Mary, Queen of Scots. Under the regency of Arran which followed, war broke out between England and Scotland, partly on account of the claims which Henry VIII. made with regard to the infant Mary's marriage, and partly on religious grounds. Mary of Lorraine during those years acted with much wisdom and moderation; but after her own accession to the regency in 1554, she allowed the Guises too much to influence her policy, the result being that the Protestant nobles combined against her in 1559. This rebellion, which she was assisted by French troops to repress, continued almost to the time of her death, which took place in Edinburgh Castle, June 10, 1560.

FRANCIS, second Duke of Guise, son of the first duke; born in Bar, Feb. 17, 1519; became one of the greatest generals of France. At the siege of Boulogne in 1545, he gained the nickname of Balafré from a severe wound in his face. Seven years later he held Metz gloriously against Charles V. of Germany, and thus prevented an invasion of France. He added to his reputation at Renti in 1554, fighting against the troops of Charles V., and in 1556 took command of the expedition against Naples. Recalled in the following year to defend the N. frontier against the English, he took Calais in 1558 and other towns, and brought about the treaty of Chateau Cambrésis in 1559. He and his brother Charles, the cardinal, probably the most capable man of the Guises, who afterward played a prominent part at the Council of Trent, then managed to possess themselves of all real power during the reign of the weak King Francis II. Putting themselves at the head of the Roman Catholic opposition to the Reformation, they repressed Protestantism with a strong arm. In the war between Huguenots and Catholics Guise and Montmorency won a victory at Dreux in 1562, and the former was besieging Orleans when he was assassinated by a Huguenot nobleman, on Feb. 18, 1563.

HENRY I., third Duke of Guise, son of Francis; born December 31, 1550. Filled by the murder of his father with bitter hatred of the Protestants, he fought fiercely against them, at Jarnac in March, 1569, and Moncontour in October, 1569, and in the same year forced Coligny to raise the siege of Poitiers. He was one of the contrivers of the massacre of St. Bartholomew, August 24, 1572, in which he personally made sure that Coligny should be slain; and subsequently he put himself at the head of the Catholic League. He had, however, a greater ambition, that of succeeding to the throne of France, for in respect of real power he was already the equal, or rather the superior of the feeble King Henry III., whose commands he set at naught and whom he so deeply humiliated that the king procured his assassination at Blois, Dec. 23, 1588.

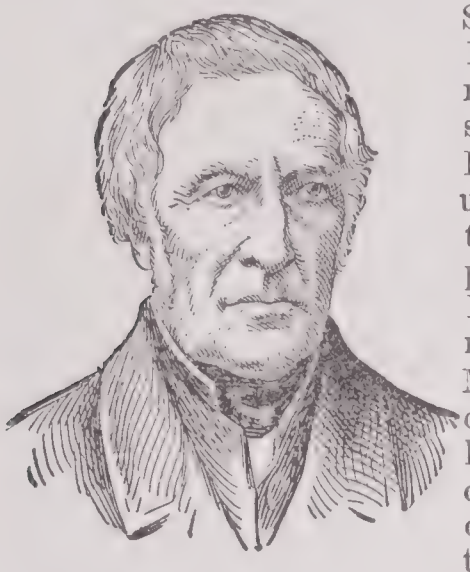
HENRY II., fifth Duke of Guise, grandson of Henry I.; born in Blois, April 4, 1614. He was destined for the Church, and at the age of 15 became Archbishop of Rheims, but in 1640, on the death of his elder brother, he succeeded to the dukedom. Having joined the league against Richelieu, he was condemned by the parliament of Paris to capital punishment, but found refuge in Flanders. He put himself at the head of Massaniello's revolt in Naples, as the representative of the Anjou family, but was taken prisoner by the Spanish forces in 1647, and carried to Madrid, where he remained five years. After another fruitless attempt to win Naples in 1654, he settled at Paris and lived the life of a courtier. He died in Paris, June 2, 1664.

Guitar (gi-tär′), a musical stringed instrument, somewhat like the lute, particularly well adapted for accompanying the human voice, and much esteemed in Spain and Italy. It was first introduced into the former country from the East by the Moors. It has six strings, and the sound is produced by the fingers of the right hand twitching the strings, while the fingers of the left hand make the notes of the music on the finger-board, which has frets across it. The three highest strings of the guitar are always of gut, and the three lowest are of silk spun over with silvered wire. The greatest virtuosi on the guitar have been Giuliani, Sor, Zocchi, Stoll, and Horetzsky.

Guiteau, Charles Julius (gē-tō′), an American assassin; born about 1840; became a lawyer in Chicago. In 1880, after the election of James A. Garfield to the presidency, Guiteau went to Washington presumably to secure the office of United States consul at Marseilles, but did not succeed. Owing to this failure and the fact that the new President was opposed to the "Stalwarts," led by Roscoe Conkling, Guiteau became greatly incensed. On July 2, 1881, he shot the President in the waiting room of the Baltimore and Potomac Railroad station in Washington; and on Sept. 19 the President died from the effect of his

wound. Letters taken from Guiteau after his arrest showed that he had planned to "remove" the President. He was indicted for murder on Oct. 7, was found guilty, after a sensational trial, on Jan. 25, 1882; and was hanged in the District of Columbia jail, June 30, following.

Guizot, François = Pierre = Guillaume (gē-zō'), a French historian; born in Nîmes, Oct. 4, 1787; educated at the gymnasium of Geneva, Switzerland. In 1805 he commenced legal studies at Paris, but gradually drifted into the literary profession. In 1812 he married Mlle. de Meulan, editor of the "Publiciste," and became Professor of History at the Sorbonne. On the fall of the empire he obtained several public offices, such as councillor of state, and director-general of the department and communal administration. In 1816 he published "The Representative Government, and the Real Condition of France" and "An Essay on Public Instruction." In 1820 the Duc de Berry was assassinated, and Guizot's party fell before an ultra-royalist reaction. In 1825 he was deprived of his chair on account of the political character of his lectures, but it was restored to him in 1828. In 1829 he again became councillor of state, and in 1830 was elected deputy for the arrondissement of Lisieux. After the July revolution he was appointed minister of the interior, but resigned in 1831. After the death of Périer, Guizot, along with Thiers and De Broglie, formed a coalition ministry, and he rendered great service as minister of public instruction. He became ambassador at the British court in 1840, and next year he became the real head of the government of which Soult was the nominal chief. He retained the office of minister of foreign affairs until 1848, and during that period opposed all measures of reform. After the fall of Louis Philippe, Guizot escaped and fled to England. Henceforth he practically retired from public life. Among his numerous works may be mentioned: "History of Civilization in France"; "General History of Civilization in Europe"; "History of the English Revolution"; "Meditations and Moral Studies"; "Memoirs in Regard to the History of My Time"; "Meditations on the Actual State of the Christian Religion"; "Biographical and Literary Miscellanies"; "History of France, told by My Small Children"; "William, the Conqueror"; and "Washington." He died in Val-Richer, France, Oct. 12, 1874.



FRANÇOIS GUIZOT.

Gujranwala (guzh-ran-wä'lä), chief town of Gujranwala district in the Punjab, India; 40 miles N. of Lahore. It was for a time the capital of the Sikh power, and Ranjit Singh was born here.

Gujarat (guzh-rät'), or **Guzerat,** the chief town of Gujarat district, in the Punjab, India; a few miles N. of the present bed of the Chenab; is a place of some military and political importance, as well as the center of a considerable trade. Here, in 1849, a decisive battle was fought, which brought the whole Punjab under British rule. Pop. (1901) 19,410.

Gulden (göld'en), a silver coin of Austria-Hungary and also of Holland, worth about 40 cents; also called a florin.

Gulf, Key of the. See KEY OF THE GULF.

Gulf of St. Lawrence, a W. inlet of the North Atlantic Ocean, touching all the British provinces of North America, Newfoundland, Canada, New Brunswick, Nova Scotia, and Prince Edward Island. It has three communications with the ocean, the Strait of Belleisle, between Newfoundland and Labrador; the Gulf of Canso, between the island of Cape Breton and the peninsula of Nova Scotia; and a far wider passage than either, with the island of St. Paul in the middle, between Cape Breton and Newfoundland; while in the opposite direction it narrows, at the W. end of Anticosti, into the estuary of the St. Lawrence river.

Gulf Stream, a well-defined current in the Atlantic Ocean. As all ocean currents are so continuous as to be really but one current connected at the two ends, so that the movement of one part is the movement of all, the Gulf stream cannot strictly be said to begin anywhere. It is due to the reflux of the equatorial current. The condensation and superheating of the last-named current takes place mainly in the Caribbean Sea and the Gulf of Mexico, whence arises the name Gulf stream. Its temperature there is about 50°. It emerges as a defined hot current through the Straits of Florida, and courses in a N. E. direction at a little distance from the coast of the United States, so affecting the Bermudas as to make their climate semi-tropical. Between these islands and Halifax the Gulf stream is about 60 miles broad, 100 fathoms deep, and moves at the rate of 3 knots an hour. It is of a deep blue color, in marked contrast to the dull green of the Arctic reflux. The Gulf stream moves in a N. E. direction to-

ward Europe. It is generally believed to be through its influence that the W. coast of the European continent is so much milder than the corresponding latitudes of America.

Gulick, John Thomas, an American clergyman; born in Kauai, Hawaii, March 13, 1832, of American parents; was graduated at Williams College in 1856 and studied theology at the Union Theological Seminary. He later went to China as a missionary and subsequently to Japan. He is a well-known writer on topics relating to evolution and natural history. His publications include: "The Diversity of Evolution under One Set of External Conditions"; "Divergent Evolution Through Cumulative Segregation"; "Intensive Segregation"; "Divergent Evolution and the Darwinian Theory"; "The Inconsistencies of Utilitarianism"; etc.

Gull, the English name of *Larus,* a genus of natatorial birds. They are widely distributed along the shores of the several seas and oceans, feeding voraciously on fish, or at certain times going some distance inland to look after worms in plowed fields. They breed on rocky headlands, making a rude nest in which they lay from two to four eggs. Many of the species are migratory, and all are powerful of wing and fly with apparent ease against a storm, during which, however, they never soar so high as in fine weather. From a great distance they see even a small fragment on the water, and with unerring precision dart down on it. They are slaughtered by thousands to provide plumes for ladies' hats. The flesh of the gull is rank and coarse, but that of the young birds is salted for winter use on many N. coasts. The eggs are much sought after for food. Gulls: (1) The sub-family *Larinæ,* one of three into which the family *Laridæ* is divided. It contains the genus *Lestris* (*Skua*), in addition to the gulls proper. (2) The family *Laridæ.* It comprehends not only the gulls, but the terns, petrels, etc.

Gull, Sir William Withey, an English physician; born in Thorpe-le-Soken, Essex, England, Dec. 31, 1816; studied at Guy's Hospital, and was graduated at London University in 1841. Six years later he was made Professor of Physiology at the Royal Institution, a post which he held for only two years. About the same time (1847) he became physician and lecturer at Guy's Hospital, his specialty being clinical practice. For his treatment of the Prince of Wales in 1871 he received a baronetcy, and became physician-extraordinary to the queen. He published: "Reports on Epidemic Cholera" (with Dr. W. Baly, 1854); "Gulstonian Lectures on Paralysis"; the Hunterian oration (1861), and the Harveian (1870); "Clinical Observations" (1869); "Alcohol as a Medicine and as a Beverage" (1878); etc. He died Jan. 29, 1890.

Gum, a vegetable secretion, sometimes occurring in intercellular spaces, formed by the separation of the walls of cells; it is viscid, but not oily. The most typical kind of gum is Gum Arabic (*q. v.*). In pharmacy gum is used as a demulcent to allay the irritation of the mucous membrane, also for suspending heavy powders, as nitrate of bismuth, when they are given in a liquid.

Gum Arabic, a gum obtained from the *Acacia arabica,* which grows abundantly in India and Arabia. It is yielded also by *A. speciosa* in India, *A. nilotica* and *A. seyal* in Arabia, *A. tortilis* and *A. ehrenbergiana* in tropical Africa, *A. mollissima* and *affinis* supply a similar gum in Australia. Gum arabic can be obtained also from *Vachellia farnesiana* of India, a small tree closely allied to the true acacias; a gum akin to it is derived from *Terminalia belerica,* a Myrobalan. Gum arabic occurs in transparent white tears, which are often colored yellow or brown by impurities; it cracks on exposure to the air on the surface; it is brittle, inodorous, and has a bland, mucilaginous taste. It dissolves in water, and the solution gives a precipitate of arabin on the addition of hydrochloric acid. Gum arabic contains about 70 per cent. of arabin, $2C_6H_{10}O_5+H_2O$, and 17 per cent. of water; the rest consists of potash and lime, which were combined with the arabin. Gum is insoluble in alcohol. By the action of nitric acid it is converted into mucic, saccharic, and oxalic acids. The specific gravity of gum is 1.35.

Gun, a strongly constructed metal tube, from which destructive projectiles are expelled by the gradually increasing pressure of gas evolved from fired gunpowder or other explosive. The term comprehends every description of firearm, from cannons, mortars and other heavy pieces of ordnance to the fowling piece, rifle and pocket pistol. The present article is restricted to an account of the construction and operation of great guns or cannons of modern type. Small arms are described in the articles Firearm; Revolver; Rifle.

In common with every other mechanical construction, the gun in its improvements has followed the progress of the mechanical arts and metallurgy; concurrent have been the improvements forced on by progress in the manufacture of gunpowder. The earliest guns now in existence show longitudinal bars hooped round with wrought-iron coils, and the light artillery of Gustavus Adolphus had an interior copper tube wound round tightly with strips of hide. Heavy ordnance or cannon latterly were made of bronze or iron cast hollow in one piece—

improvements in the casting of metal bringing this about. In 1859 Armstrong, taking advantage of the improved facilities in the manipulation of large metal forgings, reintroduced the ancient construction. Over a wrought-iron barrel were shrunk successively wrought-iron coils, increasing in thickness about the breech. Armstrong was anticipated by Prof. Daniel Treadwell of Harvard University, who invented a similar system in 1835, and constructed some built-up guns in 1855. Afterward the wrought iron of the barrel and of some of the interior coils was superseded by steel. In 1882 the British Ordnance Committee recommended that all ordnance should be entirely of steel. In 1890 the wire construction (as described below) was recommended, it having been previously advocated by Longbridge, Blakely, Mallet and Armstrong about 1855.

Gun Construction in the United States.—In the United States considerable advances were made in making cannon of cast iron. Col. Bomford, U. S. A., made investigations from 1800 to 1810 which, carried further in 1841, ultimately led to the design of guns of large calibres. Their proportions and dimensions were based on the powder pressures at different parts of the bore. These guns were designated Columbiads, and were followed in design by the French in large calibre guns for shell fire, called "Paixhans."

Gen. Thomas Jefferson Rodman, Ordnance Corps, U. S. A., evolved from 1847 to 1850 a method of casting guns hollow, with a stream of water circulating in the gun bore. The casting was made in a pit and the outside of the gun was kept warm by surrounding fires until the metal had set. This brought about, primarily, contraction from the inside. Guns as large as 20″, weighing 100,000 lbs. and throwing projectiles weighing 1,000 lbs. were successfully made by this method. A very large number of smooth-bore guns, varying from 8″ to 15″ calibre, were made on this system and formed the chief part of the armament of the fortifications of the United States during the Civil War and for 20 years after. Many of these guns were subsequently lined with forged wrought-iron tubes, rifled and converted into muzzle-loading rifled guns.

Adm. John Adolf Dahlgren, U. S. N., in 1850 devised the method of making the guns used in the United States Navy during the Civil War. The first gun was made by his method in 1852. These guns were iron, cast solid, in a nearly cylindrical form, and cooled from the outside. The guns were bored out and proportioned on the basis of the pressures given by the powders then in use. They were consequently made thick at the breech and very thin toward the muzzle.

Capt. Robert Parrott invented the method of making muzzle-loading rifled guns, also used in large numbers in the Civil War. The bodies were made of iron, cast hollow, and cooled from the inside on the Rodman system. The breech part was reinforced by a wrought-iron jacket shrunk on, while the cast part was cooled by water flowing through the bore. These jackets were made of a bar of wrought iron wound spirally, and then welded together. The guns were made from 4″ to 10″ calibre, throwing projectiles of from 30 to 300 lbs.

The United States was lacking in steel plants capable of making the large steel forgings required for high-power guns. Various methods were devised in the attempt to secure the equivalent otherwise. The Lyman-Haskell gun was breech-loading, having a number of pockets in the breech part in advance of the position of the projectile. In each of these was placed an auxiliary charge of powder. The main charge at the breech being fired, the projectile was started at a low velocity with very moderate pressures, and as the projectile passed each pocket, the charge therein was ignited and the projectile attained thereby an accelerated velocity, the pressures remaining moderate throughout. A 6″ cast-iron gun, having a steel lining, was constructed, which fired a 100-lb. projectile, using 18 lbs. of hexagonal powder at the breech and 28 lbs. of quicker powder in each of four pockets. A velocity of 3,000 feet was looked for. The gun weighed 25 tons. The principles were correct. But the advances in steel manufacture in the United States permitted the building of single-charge guns of equally high power, and the system was therefore not adopted.

The Brown segmental gun was made with the gun bore constructed of longitudinal segmental bars held together by steel wire wound on with varying tensions. A 5″ gun was built in this way, and gave excellent results. But erosions appeared in the gun bore on the line of the segments composing it. Larger guns on this system have been built, but the gun bore is in a homogeneous tube. As this is the larger part of the gun, it requires a large steel forging, as do other guns. The tests have not yet been completed.

At the present day the United States has a number of steel plants where the largest gun forgings can be made. Built-up guns up to 16″ calibre have been made successfully on the formulæ of Maj. Rogers Birnie, Ordnance Department, U. S. A. These guns fully equal in power and efficiency the best guns constructed in Europe.

Principles of Gun Construction.—When the powder charge is exploded, we may re-

Gun

gard the powder chamber, where the greatest pressure is, as a closed cylinder containing gas under great pressure, one end of the cylinder being the bottom of the bore and the other the base of the projectile. The pressure of the powder gas causes in the gun (1) a longitudinal thrust, which is met by simply locking the hoops and tubes together; (2) a circumferential tension, which requires some mathematical calculation. The cylindrical shell of a boiler being thin, the maximum circumferential tension, that is, at the interior, is approximately equal to the average tension, but in a gun or a hydraulic press the thickness of the metal is considerable, and thus the maximum tension is considerably greater, and is limited by the strength of the metal. The British Ordnance Committee laid down that the limits of tension should not exceed 18 tons per square inch for a hoop and 15 tons per square inch for the inner tube.

Barlow in 1825 gave a formula, connecting hoop tension and radial pressure in a hoop or tube of homogeneous metal, when the external pressure is inconsiderable. Later on Rankine gave the general formula when both the internal and external pressures are arbitrary. This formula shows that no thickness of metal is sufficient to stand an internal pressure greater than its working tension, if the circumferential extension of the tube is unsupported; which fact accounts for the bursting of some immense mortars. Hence, modern guns have layers of exterior reinforcing hoops, each shrunk on with an appropriate initial tension. Great economy of material is effected if all the circumferential fibers take up a uniform tension when the gun is fired; but this means an increase in the number of coils, and hence enormous cost and complication. However, by winding steel wire round the tube with appropriately varying tension all parts of the wire coils take an equal share in resisting the firing stresses. The employment of wire permits much larger working tension, its test going up to 100 tons per square inch. The hoops or wire coils are put on with the *initial stresses* or *stresses of repose*, so that the addition of the *powder stresses*, called up by the internal powder gas pressure, produces the final *firing stresses*.

Muzzle-Loaders and Breech-Loaders. — Up to modern times all guns were muzzle-loaders, but the principle of breech-loaders has been known for centuries, as is seen from specimens in museums; however, the mechanical arts were not sufficiently advanced to justify their general manufacture, so muzzle-loaders kept in vogue. In 1859 Armstrong's breech-loading system was adopted. Yet in 1863 the British Ordnance Committee stated "that the preponderance of opinion seems to be against any breech-loading system." At that time the simplicity of construction of muzzle-loaders, the absence of the necessity for obturation, and the violent gunpowders, were powerful arguments for this retrograde conclusion; consequently, the British authorities went back to muzzle-loaders. Subsequently, the new slow-burning powders that were introduced necessitated longer guns, and the difficulties of loading at the muzzle increased; hence in 1879 breech-loaders were reintroduced into the British service. Breech-loading guns involve the consideration of obturation, and that of breech mechanism, including firing locks.

Obturation. — Obturation is the prevention of any escape of gas between the breech-stopper and the powder-chamber. The earlier Armstrong R. B. L. (rifle breech-loading) guns relied on the mechanical fit of two conical copper surfaces, a separate tin cup assisting in the heavier ordnance. The French Colonel de Bange's system, adopted in 1882, consists of an asbestos pad, threaded on a steel spindle, passing through the breech screw, the axis of the spindle being hollow to form a vent (see Fig. 10 of accompanying plate). The mushroom-formed head of the spindle or steel vent being acted on by the powder gas, squeezes out the asbestos against the flat surface of the breech screw, and thus any escape of gas is sealed. The tin cup of the rifle breech-loading (R. B. L.) and the elastic steel Broadwell L-shaped ring of Krupp guns may be considered the same in principle as the base portion of a metallic cartridge case, which forms a gas-tight joint; similarly, the L-shaped leathers of a hydraulic press seal the escape of the liquid. Formerly it was thought that the thickness caused by the imperfect elasticity of asbestos prevented its use in a quick-opening breech action, but the new Vickers 6-inch quick-firing gun, firing five rounds a minute with bared cartridges, has an asbestos obturator. The obturation of other Q. F. (quick-firing) guns, as also of machine guns and small arms, is effected by a metallic cartridge case, which has also the advantage of containing the means of igniting the powder charge. The earlier rifle breech-loading (R. B. L.) guns of Armstrong had the breech closed by a separate movable steel stopper put in loosely by hand through a slot at the top or the side. The stopper was kept tight against the end of the bore by a breech screw provided on its surface with a continuous thread, which worked in a corresponding thread cut in the interior of the gun behind the slot for the stopper; hence, many turns of the screw were required to tighten up the breech stopper. Krupp guns have a cylindro-prismatic or C-shaped wedge, which is put in at a side opening with its flat end next to the end

Gun

of the powder-chamber, and is tightened up in its place by a screw at its side. The present British breech-loading guns have the "interrupted screw" system, the old R. B. L. breech stopper being done away with. The breech screw has its screw surface broken by four to six longitudinal smooth strips, and there are corresponding screwed and smooth strips in the interior of the bore at the breech. By placing the screwed relief portions of the one opposite the smooth sunk portions of the other, the breech screw is locked in the gun by an eighth or a twelfth of a turn.

In opening a breech on the interrupted screw system there are three distinct principal operations: (1) rotating the breech screw in order to bring the screwed strips parallel to the plain ones; (2) withdrawing it in its axial direction; (3) rotating it clear of the breech opening to permit of the introduction of the cartridge and projectile. In closing the breech the order of the operations is reversed. Underlying the principal operations are the minor ones of securing the breech screw in the firing position, of ejecting the empty cartridge case (when there is one), of placing the firing lock into its position, and of cocking it; for all of which automatic provision is more or less made. Automatic arrangements are also made that the gun cannot be fired until the breech is (1) locked fully home, and (2) the lock is in its firing position, supporting the head of the firing tube, which is placed in the entrance of the vent. In order to support the breech screw when withdrawn, there is a bracket or ring, attached to the gun by a hinge with a vertical bolt, around which the carrier supporting the breech can be swung.

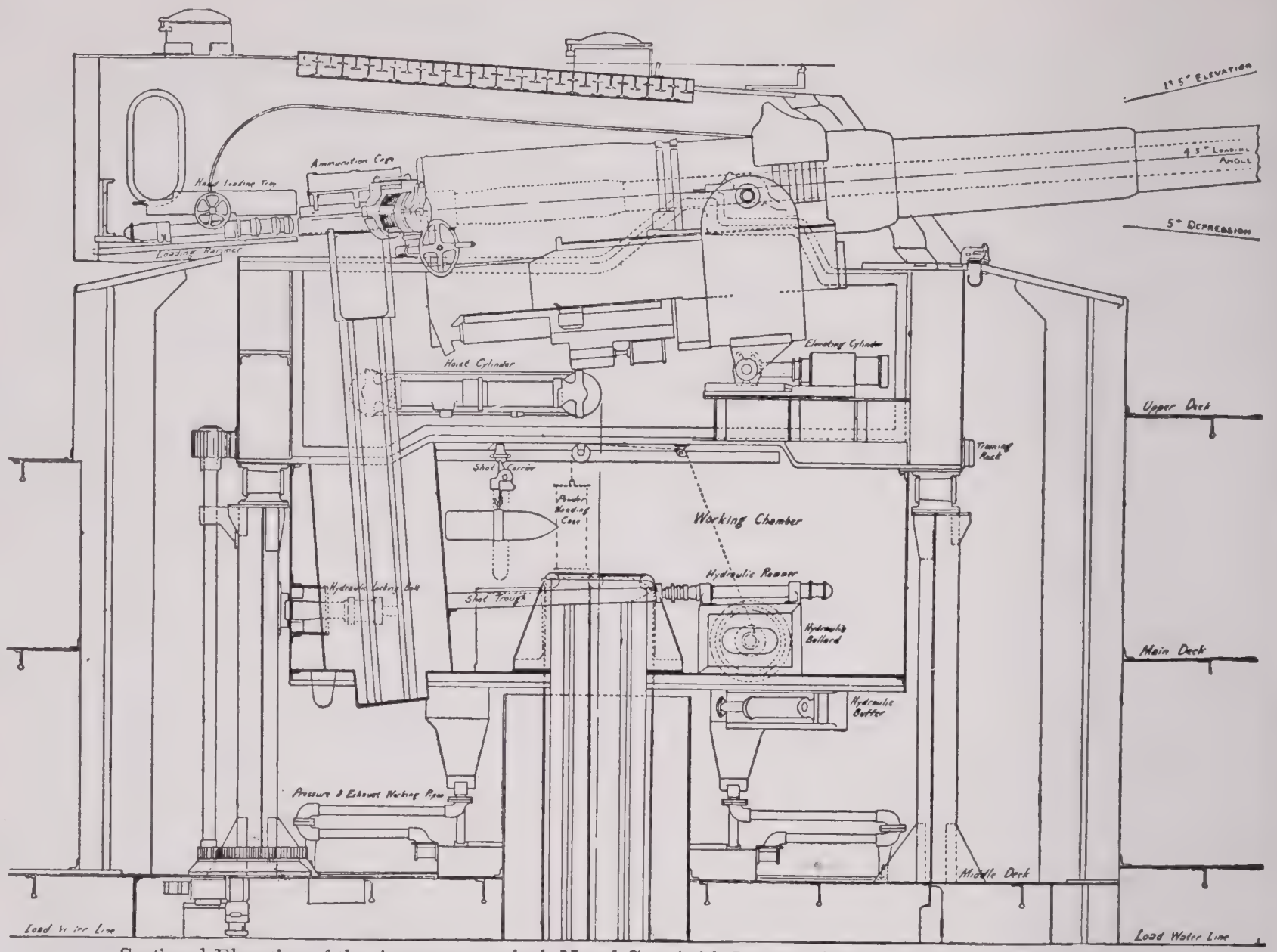
The withdrawal of a long cylindrical breech plug causes some delay. In the Elswick 4.7-inch and 6-inch quick-firing guns, this long withdrawal is avoided by tapering the front part of the breech screw to admit of its being readily swung into the loading position, after the withdrawal of the short cylindrical portion. The three principal operations were first effected by three distinct motions; afterward by a combination of levers the three motions were reduced to one.

Improvement in breech mechanism means mainly a quicker opening and closing action. In the earlier manufactured breech-loading guns the principal operations are performed in three distinct motions. In the 3 and 6 pounder Nordenfeldt and Hotchkiss quick-firing guns, the breech can be closed or opened (including the minor operations) in one motion, but their mechanism is not well suited for heavy guns. Being for naval and coast service, the sighting arrangement could be placed on the fixed portion of the mounting, quite clear of the service of the gun, which, provided with a shoulder piece, could be fired like a rifle. The rate of firing at a standing target is about 20 to 30 rounds per minute; but practically at a swift-moving target it is reduced to about 10 rounds or less. Black powder, on account of its smoke, further reduced the rate, and is no longer used.

It is evident that on the interrupted screw system the smooth strips reduce by one-half the screwed bearing-surfaces, which alone oppose the gas blowing out the breech screw; hence, in 1899-1900 the British authorities adopted the system of the Swede Welin. The bearing surfaces were increased by the device of arranging the segments at varying diameters, the breech opening being prepared in a corresponding manner. The interruptions in the gun are arranged to accommodate the segments of the screw of largest diameter; thus, when the screw is unlocked, these segments pass into the interruptions, and the segments next smaller in diameter unlock into the spaces left vacant by the larger ones. In the case of the 6-inch gun there are six segments, and four of them are threaded; that is, two-thirds of the circumference is used to resist the strain of firing. Consequently, the breech screw can be shortened, which reduces the weight and length of withdrawal and increases the length of bore for the same weight of gun.

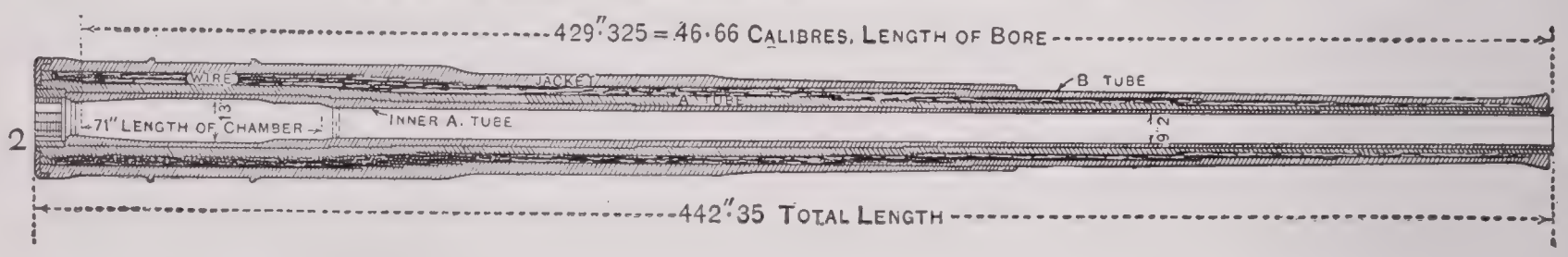
In 1889 the French firm of Canet exhibited guns in which the three principal breech operations were effected by the continuous rotation of a hand wheel at the end of a worm actuating a series of toothed gearing. A toothed pinion actuated a tooth quadrant formed on the exterior face of the interrupted screw, and turned it in the unlocked position, when a longitudinal rack on the breech screw came in gear and the latter was withdrawn, and then in its turn the toothed arrangement for rotating the carrier-ring supporting the breech screw came into play. On reversing the direction of rotating the hand wheel, the breech was closed. Levers are quickly applied in light and medium breech mechanism, but tend to become clumsy in heavier guns. Toothed gear is slow, but powerful and compact. Experience has worked out a compromise for the British service.

The breech screws of the heavier guns are difficult to unscrew, on account of their weight and the jamming of the obturating arrangements by large powder charges. In order to get over this difficulty, a powerful Stanhope lever or knuckle-joint was introduced in 1886 for the British 9.2-inch breech-loader and guns of higher natures. This is primarily a mechanism of four links connected by four pivots; three of the links rotate and one remains fixed. In descriptions, the links and pivots may be dis-



I

1. Sectional Elevation of the Armstrong 12-inch Naval Gun (with Loading-Gear), as employed on the Japanese Battleship *Mikasa*. (The *Mikasa* was accidentally blown up, Sept. 12, 1905.)



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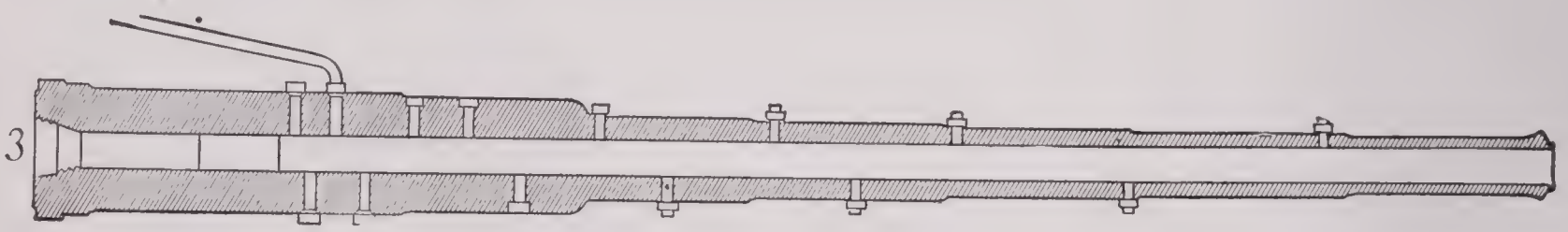
2. Cross-Section of the 9.2-inch Breech-loading Gun. (Showing wire-and-hoop construction.)



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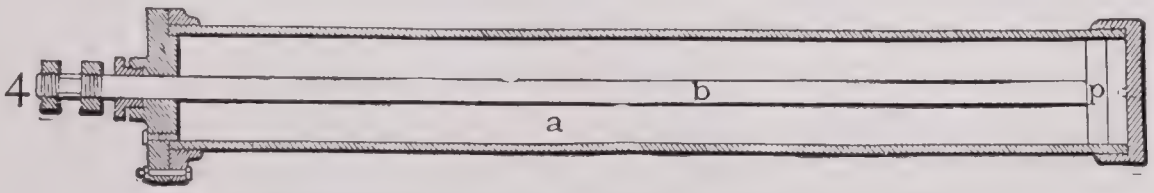
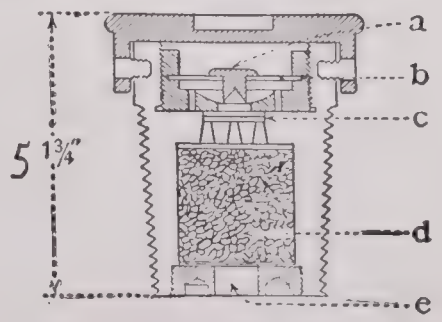
3. Cross-Section of Bore devised by Noble. (Showing crusher-gauges and wire-cutting plugs fixed.)



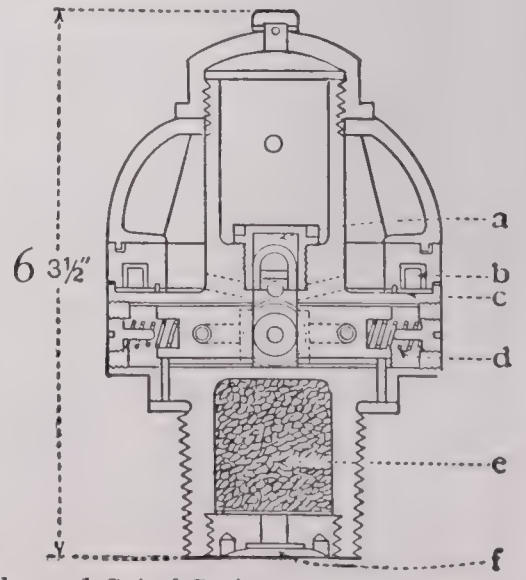
4

4. Hydraulic Buffer. (*a*, Steel Tube; *b*, Piston-rod; *p*, Piston.)

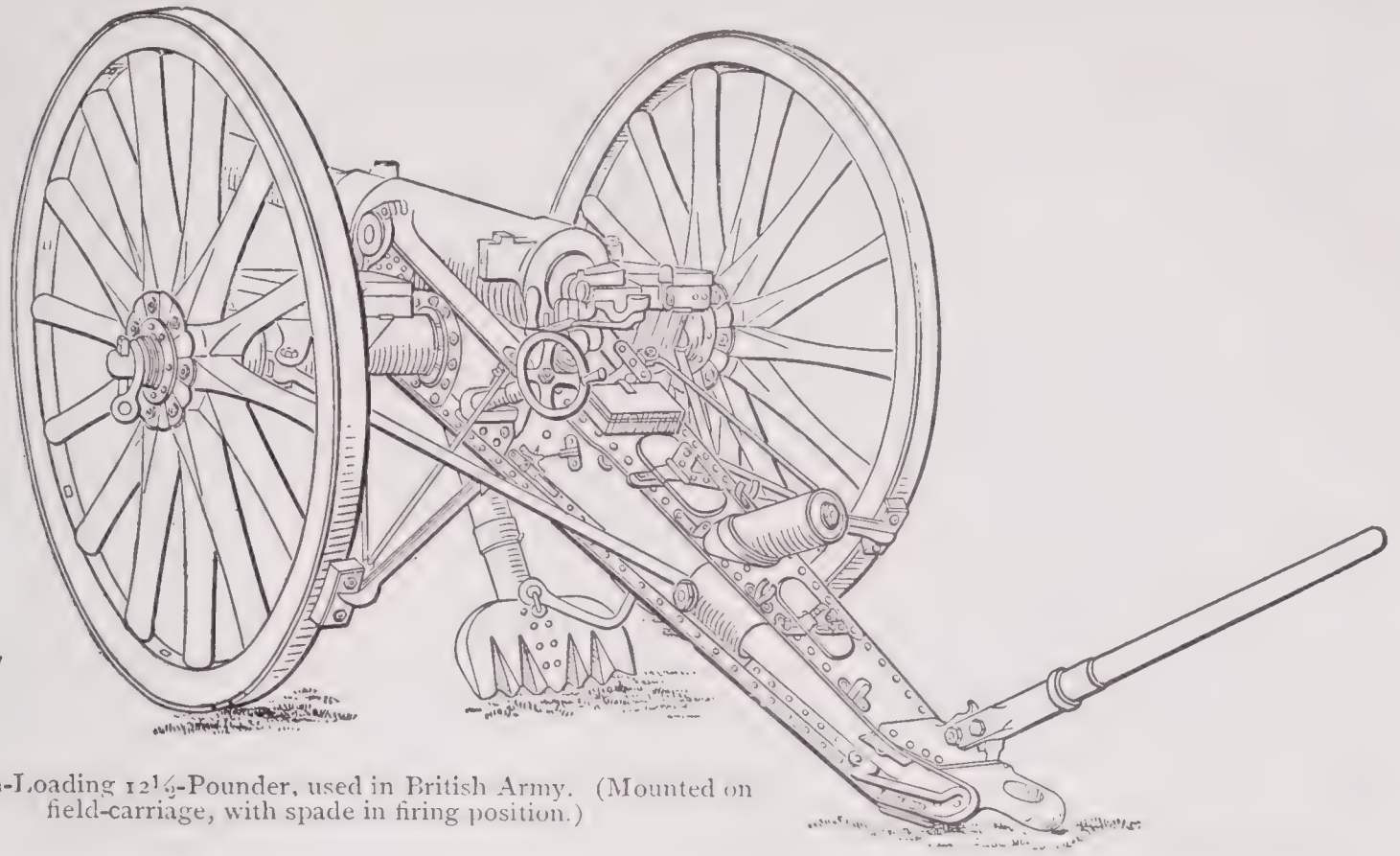


5

5. Direct-Action Percussion Fuse. (*a*, Steel Needle; *b*, Copper Suspending Disc; *c*, Detonating Compound; *d*, Powder; *e*, Flash-hole.)

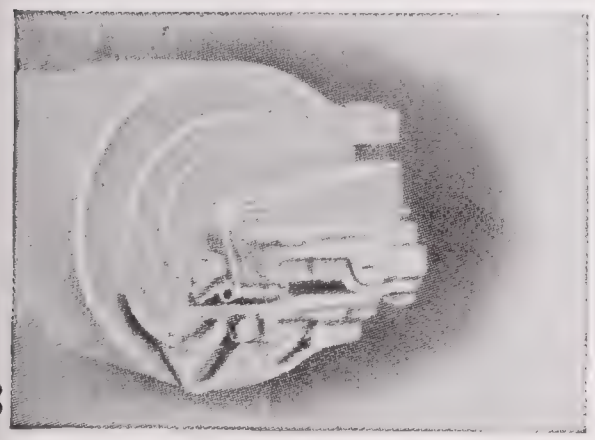


6. Sensitive Time Fuse. (*a*, Powder; *b*, Fuse Compound: *c*, Leather Washer; *d*, Spiral Spring; *e*, Powder; *f*, Flash-hole.)



7

7. Breech-Loading 12¼-Pounder, used in British Army. (Mounted on field-carriage, with spade in firing position.)



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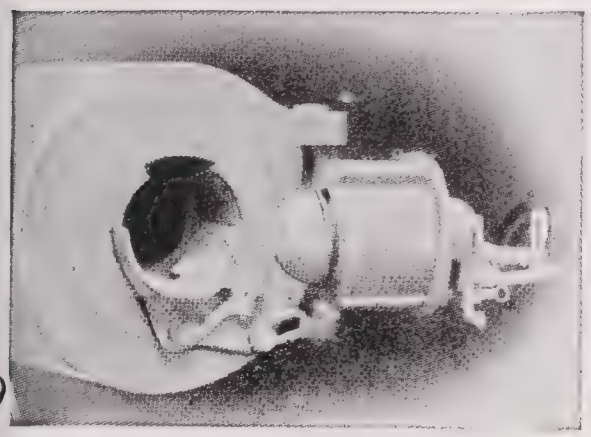

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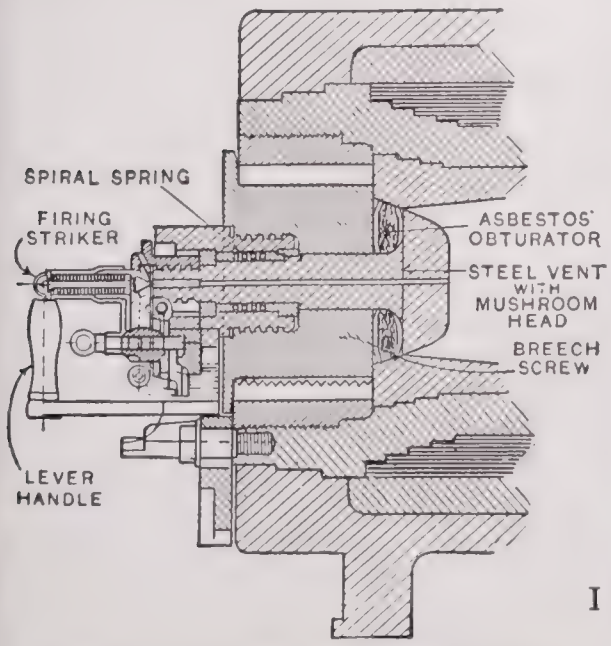
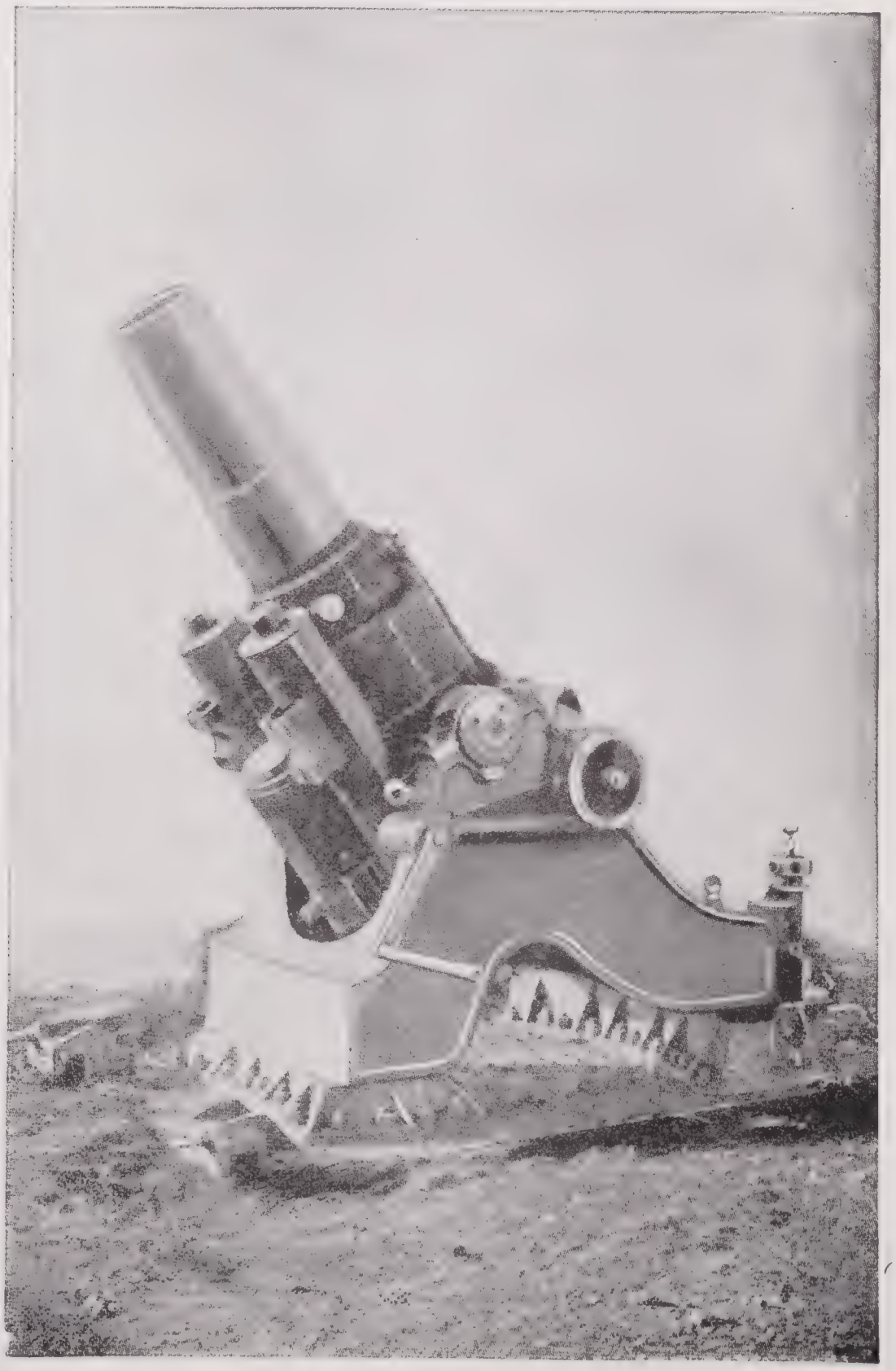


10

9-10 Breech Mechanism of Vickers-Maxim 6-inch Quick-Firer.



11

11. Skoda Howitzer (9.45-inch).

guised under the form of cranks, cams, etc. The lengths of the levers are so adjusted as to give immense leverage at one pivot. On one pivot of the fixed link is formed a ratchet wheel, which the ratchet works by means of a double pawl, and the lever combination unscrews the breech plug. A separate power-gaining apparatus withdraws or pushes home the breech plug. This is effected by a toothed pinion, keyed to the vertical hinge-bolt of the carrier, gearing into a rack let into the side of the breech plug — the hinge bolt being revolved by another toothed pinion, which itself is worked by a worm and hand-wheel arrangement. When the end of the rack is reached, the breech plug becomes automatically fixed to the carrier, and the effect of the motion then is to swing them both clear of the loading.

The horizontal swing of the lever of the Vickers-Maxim 6-inch quick-firer (see Figs. 8, 9, 10 of accompanying plate) in one motion locks or unlocks the breech plug and swings it clear of the gun. The arrangement for actuating the breech plug consists of a link, one end of which is pivoted on a pin projecting from the face of the breech plug; the other end is pivoted to a short crank which is mounted on the breech plug carrier. Around the boss of the hand lever, which is pivoted on the carrier, is a "skew gear" wheel, which gears with skew teeth formed on the boss of the short crank. As applied to the new British 9.2-inch and higher natures, the Vickers-Maxim breech mechanism differs from that of the 6-inch in having a worm-wheel on the carrier-hinge bolt, actuated by means of a worm and hand-wheel, which are fitted to a bracket on the breech mechanism frame. All the three principal operations are performed by the continuous motion of the hand-wheel.

Wire Gun.—The illustration (Fig. 2 of accompanying plate) shows the section of the 9.2-inch wire breech-loading gun, made of steel tubes, of layers of steel wire, and a jacket. The A tube is lined with the usual inner A tube hammered home to corresponding shoulders. A steel breech bush is screwed into the A tube at the rear; an eroded inner A tube can be replaced by a new one. Successive layers of flat wire are wound around the A tube, the ends being secured to steel rings. The B tube fits over the exterior of the wire. The jacket is fitted over the wire and a portion of the B tube, and is secured longitudinally by corresponding shoulders on the B tube and a screwed steel bush at the rear. The wire is wound on the gun by revolving the A tube in a lathe. One end of the wire is fixed to the tube so that the wire unreels from a drum on to the tube. The tension of the winding on is regulated by a weight and lever arrangement; it may vary from 35 to 50 tons per square inch at the commencement, and about 20 to 35 at the finish, according to the design of the gun. The inside winding tensions become gradually relieved by the tensions of the outer layers as the winding proceeds, so that each layer finishes off exactly at the "tension of repose," calculated to meet the condition that on firing the gun the wire coils are uniformly strained. The section of the wire is about .06 inch in thickness by .25 inch in width. The 12-inch breech-loader, the largest British wire gun, has as much as 100 miles of wire around its A tube.

Dr. W. E. Woodbridge of the United States designed and made a gun of wire of square cross-section wound on diagonally, successive layers being wound in opposite directions. When completed, it was to be immersed in a bath of fused bronze; thus brazing the wire into a homogeneous body. But this part of the operation was not well carried out, and the gun failed on trial. In 1889 Gen. William Crozier, now Chief of Ordnance, U. S. A., designed a wire-wound gun made of rectangular cross-section tinned. Up to date, the Crozier system of wire-wound guns has successfully borne the various tests..

Rifling. — A rifled gun has spiral grooves cut in its bore, in which, on its being fired, projections (lead coat, copper studs, gas checks, or driving bands) on the projectile are forced, and serve to give it a spin. Thus the gun can fire an elongated projectile heavier than a spherical shell and less influenced by the air resistance. The spin round the longer axis keeps its point foremost, otherwise it would turn end over end. Similarly, a top spins upright, its point resisted by the ground. Continental museums show that rifled small arms which took spherical bullets were known from an early date. In their case, the spin increases the accuracy by equalizing the air resistance on the foremost surface. Benjamin Robins first suggested in 1747 an elongated, egg-shaped bullet. Professor Greenhill, F.R.S., of Woolwich, about 1878 published a mathematical formula, from which the minimum twist at the muzzle of the gun requisite to give stability of rotation can be calculated for any elongated projectile. In his formula the velocity does not appear. The spiral grooving or twist is either (1) uniform, when the inclination of the grooves to axis of the bore is the same throughout; (2) increasing, when the inclination increases toward the muzzle, the intention being to reduce the strain at the commencement of rotation; (3) combination, as in the 9.2-inch breech-loading, the grooving being first straight and then increasing. It is now found that with a given projectile the same twist about suits high and low

Gun

velocities. Thus the 5-inch breech-loading gun, with a velocity of 1,750 feet per second, has a twist of 1 in 25 calibers; and the 5-inch howitzer, with a velocity of 782 feet per second, has a twist of 1 in 28 calibers. In high-angle fire the motion tends to become unsteady, as during descent the trajectory becomes more curved. Projectiles that have a right or left spin drift toward the right or left, respectively. The 9.2-inch breech-loading shell, fired at a range of 22,000 yards, drifted about 1,000 yards to the right. The time of flight was about 70 seconds, the maximum height ascended was calculated to be about 19,000 feet. The angle of elevation of the gun for this range was 45°; it is conjectured that the greatest ranges would be obtained in these very long trajectories by firing at elevations over 45°, as the shot is thereby carried more rapidly through the lower, denser strata of the atmosphere.

Internal Ballistics. — Internal ballistics mean the investigation of the relations connecting the pressure, volume and temperature of the powder gases and the work done by the expansion of the powder in the gun. A preliminary study is to record the pressure obtained by exploding powder in a closed explosion vessel, varying the air spacing or the gravimetric density, which tells the number of cubic inches allotted to each pound of gunpowder. Benjamin Robins of the East India Company initiated such experiments in 1743; Chevalier D'Arcy in 1760, and Count Rumford in 1792 followed. Sir A. Noble and Sir. F. Abel (1875-1894) have obtained more modern results with explosion vessels reinforced by windings of steel wire. In these experiments the gas, acting upon the piston of an enclosed crusher gauge, compresses a small copper cylinder about half an inch in length, the pressure in tons per square inch corresponding to any reduction of length, as measured to .001 of an inch by a micrometer, is then read from a table, compiled from the compression of similar cylinders under known weights. The compression of springs is likewise employed to indicate powder pressure. Among the results, Noble found that one pound of black powder exploded in an air space of 46.5 cubic inches exerts a pressure of 15.5 tons per square inch, and the pressure of one pound of exploded cordite was 63 tons per square inch; but when the air space was increased to 465 cubic inches, the pressures for pebble powder and cordite fell to 1 and 3.8 tons per square inch, respectively.

Noble, from these experiments, plotted a curve, which graphically shows the numerical connection between the pressures exerted by 1 pound of powder and the corresponding air spacings; he thence deduced the amount of work in foot tons capable of being done by one pound of powder in expanding from one air spacing to another and put the result in a table. As a practical example, take the 252-pound powder charge of the 10-inch breech-loading gun firing a 500-pound shot; the cubic capacity of the powder chamber is 8,730 cubic inches, which means that each pound of powder occupies 33 cubic inches; the capacity of the bore is 29,300 cubic inches, which means that each pound of the products of combustion occupies 116 cubic inches in the bore. From Noble's table, taking in account the work lost by expansion in the chamber, we find that each pound of the exploded powder, in expanding from 33 to 116 cubic inches, does 68 foot tons of work, or the 252-pound charge does 17,136 foot tons of work in the bore on the projectile. In other words, the force of explosion could lift 17,136 tons vertically through one foot. An increased air spacing in the powder chamber lowers the pressure in far greater proportion than the muzzle velocity; hence, heavier charges in enlarged powder chambers obtain higher muzzle velocities without increase of chamber pressure. The work done on the projectile equals its energy; hence, the muzzle velocity is calculated to be 2,480 feet per second, but if actually found by the electric chronograph of exterior ballistics, it is 2,040 feet per second, which gives the effective work done by the powder on the projectile as 14,520 foot tons. Thus, only 85 per cent. of the theoretical work has been realized, the loss of energy being due to friction of the rotating band, communication of heat to gun, etc.

Noble further experimented with guns themselves. The crusher gauges were screwed into holes made along the bore at regular intervals (see Fig. 3 of accompanying plate). The pressures of the gas indicated by the compression of the copper cylinders were checked by calculating them independently from the velocities of the shot in its passage along the bore, as found by an electric chronograph or chronoscope. In this way Noble found (1894) that a 6-inch breech-loading gun, 50 calibers long, with 27½ pounds of cordite, gave a velocity of 2.794 feet per second. When lengthened to 100 calibers, or 50 feet, its velocity increased to 3,284 feet per second. The increase of velocity of 490 feet per second increased the energy in foot tons from 2,794 foot tons to 7,478 foot tons, or a net increase of 4,684 foot tons. Thus, when a gun is fired, the relation between the pressure and volume of the powder gas can be represented graphically on an indicator diagram similar to that of a steam engine.

The employment of wire has given a greater margin of safety as regards the pressure, but the wear and life of a gun with modern large charges is now the serious problem.

The wear increases enormously with the powder charge and velocity, producing wear and pitting known as erosion. Similarly to the case of the steam engine, a large increase of power gives only a small increment of speed after a certain limit. In a 6-inch, 45-caliber gun a charge of 18 pounds of cordite gives a velocity of 2,500 feet per second; while 25 pounds is needed to give 2,800 feet per second, or an increase of 39 per cent. in the charge adds only 12 per cent. to the velocity. It is to be observed that the energies are nearer in proportion to the powder charges used than the velocities obtained, the larger powder charge being less economical. This is probably due to the fact that the larger charges are less completely burnt while in the gun than the smaller ones.

Exterior Ballistics. — Exterior ballistics refer to the projectile after leaving the bore. Tartaglia in "La Nuova Scientia" in 1554 refuted the idea that the projectile started in a straight line. Galileo in 1638 proved that the trajectory of an unresisted projectile was a parabola. His parabolic theory is still useful in the solution of problems of high-angle fire from howitzers and mortars with very low velocities, as in this case the resistance of the air can be neglected and only the attraction of gravity considered. The reverse is the case in problems of direct fire. Newton in 1687 dropped glass spheres filled with air, water, or mercury from the dome of St. Paul's Cathedral. He assumed that the retarding air resistance had two factors: (1) The square of the velocity; (2) with same velocity, the surface or square of the diameter; hence, from the observation of the time of falling the height (200 feet), he calculated the resistance of the air. Robins in 1740 invented his ballistic pendulum, which is essentially a large pendulum provided with an iron plate or a box filled with sand; the bullet strikes the plate, or else the cannon ball is imbedded in the sand. The amount of the angular recoil of the pendulum being measured, the striking velocity of the ball is calculated. Newton's results were confirmed for velocities below 850 f. s. (feet per second), but above 1,200 f. s. the resistance was about three times the amount calculated on assumption (1). Until the time of Robins, it was never realized that such a subtle elastic medium could offer so enormous a resistance, in spite of a caution put out by Newton. Between 1865 and 1870, and again in 1878-1879, the Rev. F. Bashforth fired shots through a series of wire screens 150 feet apart in connection with his electric chronograph — an instrument with a rapidly revolving lamp-blacked cylinder or disks marked by a clock or tuning fork, which gave regular intervals of time. The projectile thus interrupted an electric current passing in the wires, which are connected with a Ruhmkorff coil; the currents thus induced cause electric sparks to dot bright spots on the lampblack. Since the markings of the clock or tuning fork give the rate of rotation of the cylinder or disks, the distances between successive bright spots give the times between successive interruptions of the current in the screens. Thus the retardation or rate of decrease per second of the velocity of projectiles of known weights in pounds between the successive screens can be calculated, and hence the corresponding retarding air-resistances are known in pounds per square inch. For a further discussion of exterior ballistics see PROJECTILES, THEORY OF. In general, see also GUN BATTERY; GUNNERY; MACHINE GUN; MORTAR; ORDNANCE.

E. L. ZALINSKI.

Gun Battery, in fortification, the emplacement of one or more pieces of artillery, destined to act on the offensive or defensive. It may be: *Oblique,* having a line of fire oblique with the object; *reverse,* playing on the rear of the enemy; *cross-fire,* several batteries having a converging fire on an object; *casemate,* when protected by a bomb-proof chamber, and firing from embrasures; *barbette,* firing over a parapet; *mountain,* light pieces adapted to be dismounted and, with their dislocated carriages, carried on mules. Some of these have been made in two pieces, which unscrew for ease in transport. In field-artillery, the tactical unit of field-artillery, consisting of six or eight field guns under one command, together with the officers, men, horses, wagons, and stores. *Ricochet,* in artillery fire, means the bounding of projectiles after striking land or water; such fire was formerly much used for enfilading fortifications attacked, where smooth bore guns were used, and the bounding of the round projectile was fairly regular. The ricochet of rifled projectiles is too irregular to be reliable, and such fire is not now used. See also FORTIFICATION; GUN; ORDNANCE.

E. L. ZALINSKI.

Gun Cotton, pyroxylin. Trinitro-cellulose, $C_6H_7(NO_2)_3O_5$, more probably a nitric ether of cellulose, $C_{12}H_{14}(ONO_2)_6O_4$, as by the action of reducing agents as hydric potassium sulphide, KHS, and iron and acetic acid, it is converted into cellulose. Boiled with ferrous sulphate and concentrated hydrochloric acid, it gives off all its nitrogen as N_2O_2. Gun cotton was discovered by Schönbein in 1845. It is prepaerd by drying cotton-wool at 100°, and then leaving it for 24 hours in a mixture of one volume of nitric acid, specific gravity 1.5, and three volumes of sulphuric acid, specific gravity 1.85, the mixture being cooled to 10°. It is then washed with water, and, if required pure, again with a

Gunnery

mixture of one part alcohol and three parts ether to remove the lower nitrates. Gun cotton finely divided explodes between 160°-170°. It keeps best if it is washed with soda. Compressed gun cotton burns like tinder, but is exploded by mercuric-fulminate.

Gunnery, in one important sense, the art of directing the fire of artillery on land or on board ship. Any science exercised in the construction of guns, carriages, and ammunition, any talent in organization and tactics, is thrown away if the guns are not laid correctly on the target. The celebrated advance at Friedland by General Senarmont of 36 guns to case-shot range was a correct application of tactics based on a knowledge of this art; and the victories of the United States Navy and United States privateers over the British in the wars of the Revolution and of 1812 were largely ascribed to superiority in gunnery. In a wider sense gunnery includes the subjects discussed under GUN (*q. v.*).

The principal definitions of important terms used in gunnery are as follows. The *energy* of the projectile is the work stored up in it at the moment considered. It equals $\frac{WV^2}{2g} \div 2{,}240$ foot tons: where W is the weight of the projectile in pounds, V its velocity in feet per second, g a constant expressing the force of gravity = 32.2. As the square of the velocity appears in this expression, we can easily see that an increase of velocity has more effect on energy than an increase of weight. For instance, the 12-inch breech loader shell, with a muzzle velocity of 1,914 feet per second, has a muzzle energy of 18,137 foot tons; but the the 12-inch breech-loader shell, with a muzthe same weight, with a muzzle velocity of 1,390 feet per second, has a muzzle energy of only 9,563 foot tons. In other words, to get the same energy as the breech-loader shell, the rifled muzzle-loader shell must increase either its velocity by nearly one-third or its weight by double. The higher velocity secures a flatter trajectory at the shorter ranges. The heavier weight of projectile secures a flatter trajectory and greater remaining energy at the longer ranges.

The *caliber* of a gun is the diameter of the bore measured in inches. It is a convenient unit in the comparison of guns, considering them as mechanical models of one another. Thus, the Lee-Metford rifle of .303 inch in caliber has a bore 66 calibers (30.2 inches) long; the rifling makes one complete twist in 33 calibers (1 in 10 inches); and the bullet is 4 calibers (1.25 inch) long. Again, the wire 9.2 inch breech-loading gun, 27 tons in weight, has a bore about 47 calibers (429 inches) long, its twist is 1 in 30 calibers at the muzzle, and its shell is 3½ calibers long.

Direct fire is from guns at angles of elevation less than 15°. *Curved fire* is from howitzers at angles of less than 50°. *High-angle fire* is from guns and howitzers at more than 15°. In the naval service these terms are applied rather differently. The *trajectory* is the curve described by the projectile in passing from the muzzle to the first point of impact. It is curved, since though the force of the powder propels the projectile in a straight line, yet immediately on leaving the bore the force of the earth's gravity begins to drag it down. The trajectory is more curved with a low-velocity gun than with a high-velocity one, because the low-velocity projectile passes over any horizontal space more slowly, and gravity has more time to act upon it than upon a quicker projectile. Hence to obtain the same range the lower-velocity gun must have a greater angle of elevation above the horizontal plane. To allow for the fall of the projectile, it is necessary to point the axis of the bore of the gun as much above the mark as the projectile would have fallen below if the axis had been pointed straight on the mark. Hence formerly heavy guns were provided with a "tangent scale" *L B* (see accompanying fig.) at the breech, and a foresight *O* at the chase of the gun; the foresight being made high enough so that the gun itself does not

interfere with the aim. Small arms are all similarly provided with sights. The figure shows the principle of sighting. The line of sight is the visual ray passing through *L* the top of the tangent scale, *O* the top of the foresight, and *S* the target; *M F* shows the direction of axis of bore. On the tangent scale or sight are marked the elevations necessary for successive hundreds of yards. The tangent scale is put up and down in its socket to suit the range. Different natures of guns naturally require different elevations. The elevations for new guns are calculated theoretically for all ranges; then the calculations are tested by actually firing some rounds at a few elevations, which give data for correcting, if necessary, the elevations for the intervening ranges. Modern sights are either telescopic or have a front and rear sight fixed on a bar which has adjustments for elevations and allowances for wind deflections and movements of the target. Laying of guns by the line of sight is called direct laying. An indirect way of putting on the angle

of elevation for a range is by means of a spirit level. This is the usual method with howitzers, which generally fire from behind and over cover at unseen targets. Another indirect way much used in coast forts where the mountings are fixed, is to mark on the carriages the elevations, so that an index on the gun is elevated or depressed to the corresponding marks.

It follows that to hit a target its range must be found. This is done by instruments known as range finders. The principle of the range finder is that of measuring the angle subtended at the target by a known base. In coast forts the Watkins depression range finder, put on a known height above the sea-level, measures ranges from itself to the ship. The telescope forming part of the instrument is kept aligned on the moving ship by turning two screws, the one revolving the axis horizontally and the other vertically. The latter screw is graduated spirally in yards, and by means of a fixed index the range of a target is read off the scale. The Watkins vertical base position finder is on the same principle. It is generally placed a considerable distance from the guns. Primarily it takes the range from the instrument to the ship, but by an automatic arrangement this range is corrected to that from the guns to the ship. The corrected range is transmitted by electric dials to the guns. In "autosights" the telescope is so attached to the gun by link-and-cam work, that in elevating or depressing the gun in order to align the telescope on the ship, the gun adjusts itself to the correct range. These sights are now much used for coast service. When the coast is flat or the guns are in the field, it is necessary to have horizontal base instruments, which are difficult to manage. Field artillery prefer to fire a shell at once. If it falls short of the target, the range of the gun is increased so as to get an over or vice versa. Then a third shell is fired at an intermediate range, and so on, till the correct range is arrived at. This is called the "fork" method. The obscuring of the target by the smoke of the bursting shell indicates that the round has fallen short. In the navy Barr and Stroud's instrument is sometimes used, the images of objects being made to coincide by turning reflecting prisms. Its base is only 4½ feet. This type does not require a level patform. See also FINDER; GUN BATTERY; PROJECTILES, THEORY OF E. L. ZALINSKI.

Gunnison, a river of western Colorado. It rises on the W. slope of the Saguache Mts. and flows west, then northwest, emptying into the Grand at Grand Junction.

Gunpowder, an intimate mechanical mixture of potassium nitrate (niter), sulphur and charcoal, which do not act on each other at ordinary temperature, but when heated together arrange themselves into new forms, evolving a very large amount of highly heated gas. These three ingredients may be mixed in greatly varying proportions, each being explosive. Experience has shown the following mixture to be of the best proportions: Saltpeter 75 parts, charcoal 15 parts, and sulphur 10 parts.

The terms combustion, explosion, and detonation are used to express different phases of the same reaction, depending almost altogether on the velocity of propagation of the explosive reaction. In the case of combustion, the reaction progresses slowly: in an explosion, the velocity of propagation is relatively very rapid, and the true nature of the changes that occur is frequently lost sight of on account of the rapidity with which the different phases of the phenomenon succeed each other. Detonation represents the highest form of explosion, the time element being reduced to a minimum. By means of Nobel's chronoscope it has been shown that dry gun cotton is detonated at a velocity of about 18,000 feet a second. Berthelot has calculated that the temperature of nitroglycerine on detonation is 5,728° C. The amount of potassium nitrate can be determined by treating the powder with hot water and evaporating the solution; the sulphur can be extracted by bisulphide of carbon. The substances produced by the explosion cannot be represented by a chemical equation, as they vary with the pressure and the size of the grains of the powder. The principal products are carbonic anhydride, CO_2, carbonic oxide, CO, nitrogen, sulphate of potassium, carbonate of potassium, and sulphate of potassium.

History.—According to Sir George Staunton gunpowder has been known in China and in India from a remote period of antiquity as an agent for blasting rocks. The statement, however, is doubtful. In Europe, Roger Bacon alluded to it in his work "Of the Nullity of Magic," about A. D. 1267. A German monk, Schwartz, about 1336, is said to have discovered the method of its manufacture.

Smokeless and Noiseless Powder.—The words "smokeless and "noiseless," as applied to powder, are used in a comparative sense, as there is some smoke and some noise in nearly all these powders. It has been said that the report of a single Lebel rifle cannot be heard at a distance of more than 20 or 30 yards, that it may be said to make no smoke, and that the recoil is of no consequence. At 300 yards' range not a sound is heard when a volley is fired with it, and only a faint haze arises, which is almost imperceptible, while a shower of bullets is seen to fall on the targets, an effect produced seemingly without cause. The Germans began with the use of the Duttinhofer

Gunpowder

nitro-glycerine. These were not at first altogether satisfactory. In 1888, Alfred Nobel, the inventor of dynamite, modified explosive gelatine and invented a smokeless powder called *ballistite*. It contained at first, 40% nitro-cellulose, instead of the 7% contained in explosive gelatine, and 60% nitro-glycerine. It was subsequently modified to 50% of a low nitro-cellulose, solved in an equal proportion of nitro-glycerine. It was adopted in Germany and Italy. Nobel presented it before the British Commission on Explosives, of which Sir Frederick Abel was chairman. In 1889, Abel and Professor Dewar of this Commission patented a similar powder, but of a high nitro-cellulose, insoluble in nitro-glycerine, dissolving the nitro-cellulose in acetone and mechanically combining it with the nitro-glycerine. Five per cent. vaseline was added to it, rendering it less brittle and causing it to burn more slowly. It was adopted by the British and called *cordite*, from the shape given it of cords of varying diameter. These were made both solid and perforated. In 1902 *cordite* was modified in composition to 65% nitro-cellulose, 30% nitro-glycerine, and 5% vaseline. Various modifications of this were tried in different countries, the tendency being to reduce the nitro-glycerine and add to the mixture nitrates of different metallic bases. These provided more oxygen and served to cause the powder to burn more slowly, while increasing the velocities obtainable.

In 1887 the United States Army adopted a powder of 25% nitro-glycerine with a nitro-cellulose of 12% nitration and designated "N. N. (12.25)." This was abandoned in 1889. It was found that the nitro-glycerine in these powders was simply suspended as an admixture and not combined with the nitro-cellulose and other components. The class of powders containing nitro-glycerine was unsatisfactory, not giving uniform pressures and being of doubtful stability. These powders produced great heat and were highly injurious to the guns, seriously eroding the gun bores, and thus shortening the lives of the guns. Investigations were then made with a view of developing pure nitro-cellulose powder by means of modifications of gun cotton (*q. v.*). It was found that cotton used in making nitro-cellulose, however carefully treated, was of at least eight differing degrees of nitration in the same batch. These differed materially in their properties. Methods were devised to secure only such as were required. Vielle had arrived at the fundamental conclusion in 1886 that the explosive power given by nitro-cellulose used, was in direct proportion to the degree of nitration. The French powders were made of a mixture of nitro-cellulose of high and low nitrations. This was designated as *pyroxoline*. Professor Mendeléeff, the distinguished Russian chemist, arrived at the conclusion that a soluble nitro-cellulose of high and uniform nitration secured the best ballistic qualities and stability. On these lines he developed the collodion powders designated as *pyro-collodion*.

At the same time, Lieutenant John B. Bernadou, U. S. N., to whom had been assigned the duty of investigating and developing smokeless powders, had arrived at parallel conclusions. The United States naval powders were made on these lines, and more recently the United States Army has been developing in the same direction. Both these investigators concluded that a degree of nitration giving 12.44% nitrogen would give the best results, but this was subsequently said to have been increased to 12.65%.

Cotton steeped in nitric acid is transformed into nitro-cellulose, one form of which is *gun cotton*. As previously indicated, it may be of variable degrees of nitration. Whilst the higher forms are soluble in acetone, the lower forms require a mixture of alcohol and ether. When so dissolved, it is brought back to a solid or colloided state by evaporation. The well-known celluloid is one form of colloid. The *acetone colloid* produces a powder giving a range of from 15 to 19 tons pressure per square inch. This variation is ascribed partly to the brittleness of the powder, causing liability to being crushed into small grains and thus burning more rapidly. The *ether-alcohol colloid*, called a celluloid, gives about 16 tons pressure, but produces some smoke; the gun bore is covered with a heavy deposit of soot, and after two or three rounds this deposit is liable to be ignited and burn as the breech is opened. The celluloid is deficient in oxygen and requires modification on this account. It was found that a nitro-cellulose of 12.44% nitration produced a tough colloid, left practically no residue, and gave high velocities with the minimum of pressure and heat. It was not detonable, but would burn regularly, so that when large grains were ejected from the gun and extinguished beyond the muzzle, they were found reduced in size, but unchanged in form. The velocities and pressures obtainable were modified by changing the dimensions and shapes of the powder. Cylinders perforated and unperforated, and ribbons smooth and corrugated were used.

Desired modifications of pressures and velocities are also obtainable by changes in the relative volume of the powder-chambers of the gun. Small quantities of black powder are required to secure suitable ignition of this kind of powder. The best of the pyro-collodion powders will change somewhat in time, however carefully made or packed. This is ascribed to the gradual loss

of some of the volatile solvent material. It is thought, too, that this leaves microscopic ducts to the interior of the body of the powder. These are entered by the gases evolved and increase rapidly the ignited surfaces; the burning is no longer parallel to the surfaces, gases are evolved more rapidly than under the normal burning, and higher pressures result. It is still thought that an admixture of an oxygen carrier, as some of the nitrates or metallic bases, with a pyro-collodion base, will secure improved results of lower pressures and higher velocities. But this does not yet appear to be applied.

An insight into the comparative values of the various nitro-glycerine powders and the pyro-collodion powders can be obtained from the following table:

Substance.	Quantity of Heat	Volume of Gas	Relative Force Heat x Gas
Nitro-glycerine	145	71	10,300
High-grade gun cotton	93	86	8,000
Low-grade gun cotton	71	96	6,600

The pyro-collodion powders give a larger volume of *cooler* gas than the nitro-glycerine class, do not heat the gun so much, and, therefore, do not erode the gun bore so much. By using larger powder-chambers and somewhat larger charges of the pyro-collodion powder, as great velocity can be obtained as with the nitro-glycerine powder, avoiding the disadvantages of doubtful stability, occasional abnormal pressure and considerable eroding of the gun bores. A comparison of the Russian pyro-collodion powder with ordinary brown powder, gives, per unit of weight, an average energy of from 2.5 to 1.0. The charges of powder, therefore, may be reduced in that ratio to secure a given result.

The desiderata for smokeless powders are:

(1) That they leave no solid residue after combustion, and that their gases exercise no injurious effect upon the metal of guns;

(2) That they undergo no change upon keeping for long periods of time, and contain no volatile ingredients;

(3) That they may be readily prepared in quantities sufficiently abundant for practical needs;

(4) That they should produce a high velocity with a relatively low pressure.

See also EXPLOSIVES. E. L. ZALINSKI.

Gunpowder Plot, a plot formed in England about A. D. 1604 by Robert Catesby, various Roman Catholics of rank, goaded into excitement by the penal laws directed against their faith and its professors, joining as accomplices. Their aim was to blow up the Houses of Parliament by gunpowder Nov. 5, 1605, and destroy king, lords, and commons by one blow. An anonymous letter of mysterious warning, sent to Lord Monteagle, having led to the discovery of the plot, various conspirators were executed Jan. 30 and 31, 1606, and one May 3 following. Among those put to death was Guy Fawkes (*q. v.*), who had been caught in the vault below the House of Lords with matches and touchwood on his person ready to fire the train. Since 1605 all places connected with the Houses of Lords and Commons where explosives could be stowed away are annually searched at the opening of Parliament.

Güns, a town of Hungary, on the Güns, 20 miles S. of Oedenberg. This town was the first that successfully resisted Solyman the Magnificent, when in 1532 that monarch threatened to conquer all Europe.

Gunsaulus, Frank Wakeley, an American clergyman and educator; born in Chesterville, O., Jan. 1, 1856. He graduated at the Ohio Wesleyan University in 1875. After 1887 he was pastor of a Congregational Church in Chicago, and from 1893 was president of the Armour Institute of Technology. Among his works are: "The Transfiguration of Christ" (1886); "Monk and Knight: An Historical Study in Fiction" (1890); "Phidias and Other Poems" (1892); "Songs of Night and Day."

Gunter, Archibald Clavering, an American author; born in Liverpool, England, Oct. 25, 1847. When five years old he was taken to California by his parents. He was a mining and civil engineer in the West from 1867 until 1874, when he became a stock broker. In 1877 he removed to New York, where he devoted himself to writing plays and novels. The best known of the former are: "Courage"; "Prince Karl"; and "The Deacon's Daughter." His most popular novels are: "Mr. Barnes of New York" (1887); "Mr. Potter of Texas" (1888); "That Frenchman" (1889); "Miss Nobody of Nowhere" (1890); "Baron Montez of Panama and Paris" (1893); "A Florida Enchantment"; "A Princess of Copper"; and "Adrienne de Portalis" (1900). He died Feb. 23, 1907.

Gunter, Edmund, an English mathematician; born in Hertfordshire in 1581; educated at Westminster and Christ Church, Oxford. He invented the sector, and logarithmic scale, and was Professor of Astronomy in Gresham College, London, in 1619. He was the first to employ the terms *co*sine, *co*tangent, etc. He died in London, Dec. 10, 1626.

Gunter's Chain, a surveyor's chain 66 feet or 4 rods (of 5½ yards each) in length, having 100 links, each joined to the adjacent one by three links. A square chain is one-tenth of an acre, or 10,000 square links. It was invented by Edmund Gunter to aid in calculating areas. 7.92 inches = 1

link; 100 links = 1 chain, or 4 rods, or 22 yards; 80 chains = 1 mile.

Gunter's Scale, or **Slide Rule,** a plane scale invented by Edmund Gunter. It has various lines of numbers engraved on it, by which questions in calculation, navigation, and surveying are solved mechanically by the aid of the dividers or a slider. On one side of it are scales of equal parts, chords, sines, tangents, etc.; on the other side are the corresponding logarithmic lines. It consists of a flat ruler of boxwood, having various lines laid down upon it, by means of which various problems may be performed.

Günther, Albert Karl Ludwig Gotthelf (gün'ter), a German ichthyologist; born at Esslingen, Würtemberg, Oct. 3, 1830. He became coeditor of the "Annals and Magazine of Natural History," and author of "The Reptiles of British India" (1864); "The Fishes of the South Seas" (1873–1878); "The Gigantic Land Tortoises, Living and Extinct" (1877); and "An Introduction to the Study of Fishes" (1880).

Guntown, a village in Lee co., Miss.; where on June 10, 1864, a National force of 12,000 men, commanded by General Sturgis, was utterly routed by the Confederates, under General Forrest, losing about 3,500 men and everything except arms.

Gurges, or **Gorges,** in heraldry, a charge meant to represent a whirlpool. It takes up the whole field; and when borne properly is azure and argent.

Gurjun Balsam, or **Wood Oil,** a liquid obtained from one of the *Dipteraceæ* which grows in the Andaman Islands. It resembles in characters and medicinal properties copaiba balsam, and has at various times been sold as such. It has been used as a substitute for copaiba, chiefly in the Indian hospitals, but its chief use in the East is as a varnish for boats and for preventing the attacks of ants on timber. It was used for the checking and alleviating of leprosy in Hawaii and by the late Father Damien among the lepers of Molokai.

Gourney, Sir Goldworthy, an English inventor; born in Treator, England, Feb. 14, 1793; studied medicine, but later turned his attention to chemistry. His inventions include the oxyhydrogen blowpipe, the lime-magnesium and oil-gas lights, the high-pressure steam jet, the tubular boiler, a steam carriage, etc., and he claimed to have been the first to observe the deflection of the magnetic needle by voltaic cross currents. He was knighted in 1863. He died in Reeds, England, Feb. 28, 1875.

Gurney, Joseph John, an English philanthropist; born in Earlham Hall, England, Aug. 2, 1788; became a Quaker clergyman. He was very active in prison reform, and was closely identified with Wilberforce and Clarkson in the anti-slavery movement. He was the author of "Notes on Prison Discipline" (1819); "Evidences, Etc., of Christianity" (1827); etc. He died in Earlham, England, Jan. 4, 1847.

Gurowski, Adam, Comte de (grof'skē), a Polish author; born at Kalisz, Sept. 10, 1805. In early life he was a leading Polish patriot and an instigator of the revolution of 1830. Later he became an advocate of Panslavism, and was employed in Russia. In 1841 he left the latter country and studied in Berlin and in Bern, Switzerland. In 1849 he came to the United States, and from 1861 to 1863 was a translator in the State Department at Washington. Among his works, several of which were written in French and German, are: "Civilization and Russia" (1840); "Panslavism" (1848); "Russia as It is" (1854); "The Turkish Question" (1854); "My Diary: Notes on the Civil War" (1862 to 1866). He died in Washington, D. C., May 4, 1866.

Guseck, Bernd von (gös'ek), pseudonym of GUSTAVE VON BERNECK, a German novelist; born in Kirchhain, Niederlausitz, Oct. 28, 1803. His novels have for the most part a historical background, and are meritorious without being great. "The Hand of the Stranger," "The First Robbery in Germany," and "Katharina von Schwarzburg," are noteworthy in a somewhat extended list. He wrote a play or two, translated Dante's "Divine Comedy," and completed a history of the art of war. He died in Berlin, July 8, 1871.

Gusset, in engineering, an angular piece of iron inserted in a boiler tank, etc., where it changes from a cylindrical to a square form, etc., as in the junction of the barrel and fire box of a locomotive.

In heraldry, an abatement or mark of disgrace somewhat resembling a gusset, and formed by a line drawn from the dexter or sinister chief point one-third across the shield, and then descending perpendicularly to the base. It may be on either the dexter or sinister side of the shield; on the former it is an abatement for adultery; on the latter for drunkenness. Also a small piece of chain or plate armor inserted at the junction of the armor under the arms, for the purpose of protecting that part when exposed by the movement of the arms.

Gustafson, Zadel Barnes Buddington, an American author; born in Middletown, Conn., about 1841. Her poem "Little Martin Craghan" was very popular. Among her well-known works are: "Can the Old Love?" (1871); "Meg, a Pastoral."; and other poems, 1879.

Gustavus I., commonly called GUSTAVUS VASA, King of Sweden from 1523 to 1560, and deliverer of his country; born, according to recent authorities, in Lindholmen, Upland, May 12, 1496. He was the son of Eric Johansson, a Swedish senator and governor of Aland, from whom he derived the surname of Ericsson. Both his parents are said to have been descended from the ancient kings of Sweden. He studied at the University of Upsala, and entered the service of Sten Sture the Younger, administrator of the kingdom in 1514. Sweden had by the union of Calmar become subject with Norway to the crown of Denmark. The country was at this time divided into two parties. There was a Danish party headed by the Archbishop of Upsala, and a Swedish party, which upheld the independence of the country, headed by the administrator whom it had raised to power. Gustavus fought with distinction under Sture against the Danes in 1517 and 1518. He was one of six nobles sent by Sture to Christian II. in 1518 as hostages for the safety of the king during an interview. Christian sent him to Denmark, where he was put under the charge of one of his relations, Eric Baner, Lord of Kallö in Jutland. Here he remained more than a year, but hearing of the preparations made to subdue his country, he effected his escape and reached Lübeck in 1519. After wandering about for some time as a proscribed fugitive he took refuge in the mines of Dalecarlia where he worked as a common laborer. At length, after various adventures, he collected some adventurous spirits, and betook himself to open resistance. Christian II. was crowned at Stockholm on Nov. 4, 1520. On the 8th the heads of the Swedish party, among whom was Gustavus' father, were executed. By the beginning of 1521 Gustavus had raised a considerable force, driven the Danes from several positions, and excited a general insurrection in Dalecarlia. On April 29 he defeated the Danes at Westeraas; in July he seized Upsala. On Aug. 24 he was named administrator of the kingdom by the States which had assembled at Wadstena. On June 6, 1523, he was elected king by the Diet of Strengnäs. On the 20th he became master of Stockholm, which he had besieged three times. He deferred his coronation to avoid taking the oath to support the Church, as he had become a convert to Lutheranism, and had determined to humble the clergy, whose power was excessive.

In 1527 he obtained the exclusion of the bishops from the senate and their subjection to the civil power. He now openly professed Lutheranism, and was crowned by a Protestant archbishop of Upsala on Jan. 12, 1528. The Lutheran religion was formally established at a diet held at Örebro in 1529. He formed an alliance with Frederick I. of Denmark against the deposed Christian II. who had landed in Norway in 1531 and been joined by Trollé, the deposed Archbishop of Upsal, and other Swedish malcontents. He entered into an alliance in 1535 with Christian III. of Denmark against the Lübeckers. A protracted insurrection of the peasantry to put an end to the privileges of the nobility engaged his attention from 1537 to 1543. In 1544 the States assembled at Westeraas declared the kingdom hereditary in his house. A war broke out with Russia in 1555, which was concluded by the peace of Moscow, April 2, 1557. He died in Stockholm Sept. 29, 1560.

Gustavus II., GUSTAVUS ADOLPHUS, King of Sweden; a grandson of Gustavus Vasa; born in Stockholm Dec. 9, 1594, and received a most careful education. He was master of Greek and Latin and several modern languages. He was trained to war under experienced generals, and at the age of 16 he took his place in the State council. Charles IX., the father of Gustavus, had been declared king to the exclusion of his nephew Sigismund, who, on accepting the crown of Poland during his father's lifetime, had abjured the Protestant religion. On the death of Charles, Gustavus succeeded him, with the consent of the States, as king-elect. Sweden was at this time at war with Denmark, and Gustavus, then in his 17th year, was in command of the army. He chose for his chancellor and first councillor Axel Oxenstiern, a man 10 years his senior, but already eminent for his ability, and who eventually proved himself to be one of the greatest of European statesmen. The war with Denmark was concluded through the mediation of England in 1613. A new enterprise at this time presented itself to the ambition of Gustavus — the throne of Russia was vacant and contested. A party favored the election of Charles Philip, the brother of Gustavus, and was supported by a Swedish invasion under General de la Gartie, who had penetrated to Novgorod; while the Poles, who had also invaded Russia, had reached Moscow. Michael Romanoff was, however, elected czar. Gustavus took a personal share in the Russian war, which continued for about four years after this election, and in conjunction with La Gardie had made considerable conquests in Livonia and the neighboring provinces, when peace was concluded at Stolbova in 1617. In 1620 he married Eleanora, sister of the Elector of Brandenburg. The war with Russia was followed by a protracted war with Poland, with which, owing to the claims of Sigismund, Gustavus could hardly be said to have ever been at peace. The war lasted nine years, and was concluded on advantageous terms for Gustavus by a six years' truce in September, 1629. He had made important conquests, which he was allowed to retain, in East Prussia.

His attention was now diverted from Northern wars by the affairs of Germany. The oppression of the Protestants by Ferdinand II. excited his sympathy. He was alarmed by the progress of Wallenstein, which threatened to extend the empire to the Baltic, and by leaguing himself with the Protestants of Germany he might hope for easier and more extensive conquests than by struggling single-handed against the Northern powers. He named his daughter Christina heiress to the throne, embarked for Germany on May 30, 1630, and landed on June 24 with an army of 13,000 men in the island of Usedom on the coast of Pomerania. The details of his career in Germany will be found more fully in the article on the Thirty Years' War. After repeatedly defeating the imperial generals, and conquering a great part of Germany, he was killed in the battle of Lützen, Nov. 16, 1632. Gustavus differed from some other great commanders in preferring a small well-ordered army to a large one. He used to say that all over 40,000 men were an incumbrance. His character made him beloved by his soldiers, and he was served with a devotion which enabled him to effect great things with small means. The discipline he imparted to the Swedish army and the prestige of success derived from his victories, lasted long after his death. His body was taken to Sweden.

Gustavus III., King of Sweden; born in Stockholm, Jan. 24, 1746; was the eldest son of Adolphus Frederick, Duke of Holstein, who had been called to the Swedish crown in 1743. He succeeded his father on Feb. 12, 1771. He found the country divided between two aristocratic factions, the adherents of France and Russia, known respectively as the Hats and Caps. He resolved to give the country a new constitution, and to increase the power of the crown. He instituted the new military order of Vasa, in order to gain the good will of the officers; and having taken other measures to secure support, he effected his purpose by means of a sham revolt, which enabled him to assemble troops, wherewith he surrounded the assembly of the States General, and forced them to accept his constitution, which, as it only circumscribed the privileges of the nobility, was generally popular. In 1788, when war had broken out with Russia, the nobles revenged themselves by inducing the States General to refuse him supplies. The fidelity of the Dalecarlians enabled him to repulse the enemy. He determined on another *coup d'état*, which he executed on April 3, 1789, by causing the leaders of the opposition to be arrested, and then passing a law extending the royal prerogative. He concluded peace with Russia by the treaty of Varela, Aug. 14, 1790. His hatred of the principles of the French Revolution now induced him to enter into a friendship with Catharine of Russia, and he made the most strenuous exertions to form a coalition against France. The Swedes were opposed to an alliance with Russia, and a diet which Gustavus assembled at Gefle for the purpose of procuring supplies, though surrounded with troops, proved so refractory that he was obliged to dismiss it, Feb. 24, 1792. The nobles had long before this formed a conspiracy against him and resolved on his death. Three of them took an oath to murder him and drew lots which should carry out their intention. The lot fell on Captain Ankarström, who shot the king in the back at a masquerade at Stockholm March 16, 1792. He died on March 29.

Gustavus IV., Adolphus, King of Sweden; born in Stockholm, Nov. 1, 1778; succeeded, on the death of his father, March 29, 1792, but was under the guardianship of his uncle, the Duke of Sudermania, till 1796. In 1796 he visited the court of Catharine II. of Russia, and proceeded so far in a negotiation for a marriage with her granddaughter, Alexandra Paulovna, that the court was assembled for the marriage ceremony, when the king drew back and refused to sign a marriage contract which contained among other stipulations one for allowing the princess the free exercise of her religion. He afterward married Frederica, Princess of Baden. On assuming power Gustavus showed that he had inherited his father's hatred of the principles of the French Revolution, which he carried to the extent of fanaticism. He joined the second coalition contrary to the wish of his subjects. In 1803 he made a journey to Germany to promote a union of the German princes against Napoleon. He was at Carlsrhue when the Duke D'Enghien was seized, and sent his aide-de-camp to Paris to protest against that act of violence. In 1806 he returned to the King of Prussia the order of the Black Eagle because he had bestowed it on Napoleon, and refused to take part in the German Diet because it was under the influence of the usurper. After the peace of Tilsit he exposed himself to a war with Russia while he was at war with France, by refusing to join the continental blockade and opening his ports to England; and in 1808 he quarreled with England, his only ally. His internal policy was as bad as his external. His subjects were oppressed with taxes to support his wars, and had in return the humiliation of finding Pomerania in the possession of France, and Finland in that of Russia. Their patience was at length exhausted. A conspiracy was formed against him. He was deposed, and the Diet by a decree of May 10, 1809, declared his family forever incapable of succeeding to the crown of Sweden. His uncle, the Duke of Sudermania, was proclaimed king, under the title of Charles XIII., and

in the following year adopted as his successor, Bernadotte, Prince of Pontecorvo. Gustavus died in poverty in St. Gall, Feb. 7, 1837. He took the title of Colonel Gustafson, and has left, among other writings, "Memoirs of Colonel Gustafson" (1823).

Gustavus V, King of Sweden, born in Stockholm, June 16, 1858; eldest son of the late King Oscar II.; married the Princess Victoria of Baden, Sept. 20, 1881; acted several times as regent of the Kingdom during his father's illness; succeeded to the throne, on the death of his father, Dec. 8, 1907; Crown Prince and heir-apparent, Gustavus Adolphus, born Nov. 11, 1882, married Princess Margaret of Connaught, June 15, 1905.

Gut, a term used in zoölogy as equivalent to the alimentary canal. Three parts are distinguished: (1) the fore-gut, lined by the outer layer or ectoderm; (2) the mid-gut or mesenteron, lined by the inner layer or endoderm; and (3) the hind-gut or proctodæum, lined by the outer layer or ectoderm. These parts vary in size and function in different classes; but the mid-gut is the most important.

Gutenberg, Johannes, or **Henne** (gö'-ten-berg), a German printer; born in Mainz, about 1400. In 1434 he was living in Strasburg, and seems to have been well known as a man of considerable mechanical skill, who taught stone cutting, mirror polishing, and similar arts. When and where he made his first attempts in the art of printing cannot with certainty be ascertained. Sometime between 1444 and 1448 he returned to Mainz, where, in 1449 or 1450, he entered into partnership with Johannes Fust or Faust, a wealthy goldsmith, who furnished the money required to set up a printing press. This partnership was, however, dissolved after the lapse of a few years, Fust bringing an action at law against Gutenburg to recover the sums he had advanced. In consequence of the legal verdict, Fust retained the printing concern, and carried it on in conjunction with Peter Schöffer of Gernsheim. Gutenburg, with the assistance of a Dr. Homery, afterward set up another printing press. He is considered the inventor of movable type. He died in Mainz, Feb. 24, 1468.

Guthrie (guth'ri), a city of Oklahoma, county-seat of Logan co., and capital of the State; on Cottonwood creek and the Atchison, Topeka, and Santa Fé and other railways. Among the more important buildings are St. Joseph's Academy and the State Capitol. A considerable trade is carried on, and there are manufactures of lumber, flour, machinery, cotton products, etc. Pop. (1890) 5,333; (1900) 10,006; (1910) 11,654.

Guthrie, James Cargill, a Scotch poet; born in Forfarshire, Aug. 27, 1814; a prominent clergyman, but for years a librarian at Dundee; wrote some exceedingly happy studies in verse—"Village Scenes" (1851); "Wedded Love" (1865); and "Woodland Echoes" (1878); besides a volume on "Old Scottish Customs" (1885); a pleasing work in prose.

Guthrie, Samuel, an American chemist; born in Brimfield, Mass., in 1772. He was one of the original discoverers of chloroform, which he termed a "spirituous solution of chloric ether." His process was tested as early as 1831. He died in Sackett's Harbor, N. Y., Oct. 19, 1848.

Guthrie, Thomas, a Scottish clergyman; born in Brechin, Forfarshire, July 5, 1803; educated at the University of Edinburgh, and was licensed as a preacher in connection with the Church of Scotland in 1825. He did not at once exert himself to procure a church, but assisted his father in the business of his banking office, and also spent the winter of 1826–1827 in Paris studying medicine. In 1830 he was presented to the parish of Arbilot, and he accepted a call to Greyfriars, Edinburgh, in 1837, where he soon became very popular with all classes. In 1843 the Disruption took place, and Guthrie took an active part with Chalmers and Candlish in organizing the Free Church. He himself became minister of Free St. John's, Edinburgh. The work with which his name is chiefly identified out of Scotland was the introduction into Edinburgh of the ragged school system, then recently originated in London and Aberdeen. His "Plea for Ragged Schools" (1847) is one of the most celebrated of his productions. In 1849 he received the degree of D. D. from the University of Edinburgh. He became editor of the "Sunday Magazine" in 1864, but never assumed full editorial responsibility. His chief works are, "The Gospel in Ezekiel" (1855); "A Plea for Drunkards" (1856); "Christ and the Inheritance of the Saints" (1858); etc. He died in St Leonard's Feb. 24, 1873.

Guthrie, Thomas Anstey. See ANSTEY, F.

Guthrie, William, a Scotch author; born in Brechin, Forfarshire, in 1708; educated at King's College, Aberdeen. At an early period he removed to London, where he worked hard for 40 years as a man of letters. Among his various works are a "History of England" (1744–1750), and "A Historical and Geographical Grammar" (1770). He died in London, England, March, 1770.

Gutierrez, Antonio Garcia (gö-tē-ēr'-reth), a Spanish dramatist; born in Chiclana, Cadiz, in 1812. He gave up medicine

for the profession of letters; living at first in great destitution, until the play "El Trovador" made him famous and immensely popular. He visited the United States in 1844. Later he became a theatrical manager in Madrid, writing "The Campaign of Huesca," "The Page," and other noble tragedies. He died in Madrid, Aug. 26, 1884.

Guts Muths, Johann Christoph Friedrich (göts' möts), a German teacher; born in Quedlinburg, Prussian Saxony, Aug. 9, 1759; studied at Halle, and from 1785 to 1837 taught gymnastics and geography in Salzmann's scholastic institution at Schnepfenthal. He is specially remembered for having introduced gymnastics as a branch of education in German schools. On this subject and on geography he wrote numerous text-books, as "Gymnastics for the Young" (1793); and "Handbook of Geography" (1810); he also edited "Pedagogical Library" (1800–1820), and, along with Jacobi, "German Land and German People" (1820–1832). He died May 21, 1839.

Gutta, a white substance obtained by treating gutta-percha with boiling ether and allowing the filtrate to cool; the gutta is then deposited and again boiled with ether till the ethereal solution retains nothing in solution on cooling. By dry distillation it yields hydrocarbons. The part of the gutta-percha removed by the ether consists of albam and fluavil, which are oxidized gutta.

Gutta-percha, the inspissated juice of *Isonandra gutta*, the gutta-percha tree. It occurs in tough, flexible pieces of a light-brown color, which are soluble in benzene, chloroform, and bisulphide of carbon, insoluble in water, and only slightly soluble in alcohol and ether. In hot countries it is liable to be oxidized by the action of the air and loses its flexibility. The raw gutta-percha comes in lumps weighing from five to six pounds. These are cut into slices, torn to shreds, and then thrown into cold water, when the impurities sink and the pure gum rises to the surface. Then the shreds are transferred to hot water, and, finally, they are made into solid masses, from which the moisture is driven out by kneading. Gutta-percha is used for making soles of boots impervious to water, for door handles, ear trumpets, golf balls, etc. It is made into bottles to contain hydrofluoric acid, as it is not acted on by that acid. Above all it is employed for coating submarine telegraph wires, partly to protect them from the salt water, partly to insulate them, gutta-percha being a decided nonconductor of electricity.

Gutta-percha Tree, a tree of the order *Sapotaceæ*. It is a large tree, 60 or 70 feet high, its trunk having a diameter of two or three feet. It grows in Borneo, Sumatra, Singapore, and other islands of Southeastern Asia. It was first brought to notice by Dr. Montgomery, of Singapore. It was then common, but the Malays, having wastefully cut down the trees to obtain the juice, instead of tapping them at intervals, have now rendered the tree extinct at Singapore.

Gutta Rosea. See ROSACEA.

Guttiferæ (-tif'e-rē), a natural order of exogenous plants, consisting of trees and shrubs, natives of tropical countries, very generally secreting an acrid yellow resinous juice. A few are epiphytes. The leaves are opposite, destitute of stipules, leathery, and entire. In botanical characters this order is allied to *Hypericinæ*. It contains about 150 known species, the greater part of them South American, although all tropical countries produce some. The resinous secretions of some are valuable, particularly of those trees which yield gamboge and tacamahaca. A few species afford valuable timber. The flowers of some are very fragrant; those of *Mesua ferrea* are found in a dried state in every bazaar in India and are used as a perfume.

Guttinguer, Ulric (gü-tan-gā'), a French author; born in Rouen, France, in 1785. He was an extreme partisan of the romantic school. He won fame with "Nadir," a collection of criticisms, and essays on literary and sentimental subjects. His masterpiece, however, is the volume of "Poetic Miscellany," originally contributed to the Muse Française. He wrote several novels, a "Dithyramb on Lord Byron's Death," impressions of travel, and much fugitive verse. He died in Paris, Sept. 21, 1866.

Gutzkow, Karl Ferdinand (göts'kō), a German author; born in Berlin, March 17, 1811. His essay "On the Fate-Decreeing Deities" won him a prize and reputation; and his next performance, "The Forum of Literature and the Press," obtained for him a place as assistant to Wolfgang Menzel, then the greatest editor in Stuttgart. "The Letters of a Fool of a Man to a Fool of a Woman," and a fanciful tale, "Maha Gurn, the Story of a God," were very popular. He incurred the censure of the authorities and brought about a rupture with Menzel by injudicious utterances in his journal; and was thrown into prison, where he wrote his "Philosophy of History." He had already brought out his "Wally, the Skeptic," a novel which added as much to his troubles as to his fame. His plays are considered his best work: notably "Queue and Sword," a comedy; "Uriel Acosta," a tragedy; "The King's Lieutenant," a drama in which the young Goethe is portrayed; and five or six others. Of his novels, "The Knights of the Soul" and "The Magician of Rome"

have attained a wide popular circulation and influence. He died in Sachsenhausen, near Frankfort-on-the Main, Dec. 16, 1878.

Gützlaff, Karl Friedrich August, a German missionary to China; born in Pyritz, Pomerania, July 8, 1803. Going out to the East under the auspices of the Dutch Missionary Society, he spent two years in Batavia learning Chinese. In 1828 he went to Bangkok, Siam, where he translated the Bible into Siamese, reaching China in 1831. During the rest of his life he lived mostly at Macao and Hong Kong, occupying himself with a translation of the Bible into Chinese, writing various books in Chinese, German, and English, and training native preachers to carry the Gospel into the interior. He rendered valuable assistance to the British during the war of 1840–1842 and the subsequent negotiations for peace. He published a "Journal of Three Voyages along the Coast of China"; "China Opened" (1838); "The Life of Tao-Chang" (1838); and a history of China in German (1847). He died in Hong Kong, Aug. 9, 1851.

Guy, Thomas, an English philanthropist; founder of Guy's Hospital, Southwark, London; born in London in 1644. He began business in 1668 in the angle formed by Cornhill and Lombard street, as a bookseller, dealing extensively in the importation of English Bibles from Holland, and, on this being stopped, he contracted with the University of Oxford for the privilege of printing Bibles, which he continued to do for many years. By this means, and by selling out his original shares in South Sea stock at a great advantage, he amassed a fortune of nearly £500,000. In 1707 he built and furnished three wards of St. Thomas's Hospital. For the building and endowment of the hospital in Southwark which bears his name he set apart over $1,000,000. He was also a liberal benefactor to the Stationers' Company, and built and endowed almshouses and a library at Tamworth, for which he became one of the members about 1694. Besides bestowing $2,000 a year on Christ's Hospital, and giving to various other charities, he left $400,000 to be divided among those who could prove any degree of relationship to him. He died Dec. 27, 1724.

Guy of Arezzo. See GUIDO ARETINUS.

Guy of Warwick, the hero of one of the most ancient and popular of early English metrical romances. It is a purely English story of the 13th century, related to the Dano-Saxon romance of "Havelok" by its allusions to Danish wars in England, and to the French "King Horn" by its adoption of some of the more striking incidents in that story. Its authorship may be due to Walter of Exeter, a 13th-century Franciscan monk, but it has undoubtedly been improved by some French or Norman minstrel. The story has close affinity with that of Guido Tyrius in the "Gesta Romanorum." The hero, Sir Guy of Warwick, is son of Segard, steward of Rohand, Earl of Warwick; his instructor in the exercises of chivalry, the famous Hérand of Ardenne. Having fallen deeply in love with Felice, the fair and accomplished daughter of the earl, he fell into a grievous sickness, but was recalled to life by a promise of her hand when he had earned it by knightly deeds. Immediately he crossed to Normandy, at the great tournament of Rouen vanquished every competitor, and at once set out into far lands, traveling through Spain, Almayne, and Lombardy, and gaining the prize in every tournament. He then returned to England, and overcame the famous Dun Cow on Dunsmore Heath, near Warwick. But his haughty mistress was still unsatisfied. Once more he left his country to traverse Flanders and Italy, and here he well-nigh lost his life through the treachery of Otho, the "felon duke" of Pavia. He next went to Constantinople to save the Emperor Ernis from the Saracens, slew the mighty Coldran, and scattered his huge army. The grateful emperor pressed on him the hand of his lovely daughter and heiress Loret, but, faithful to Felice, Sir Guy tore himself away, and returned, with many adventures by the way, to his native country. No sooner had he reached its shores than tidings were brought of a most portentous dragon then ravaging Northumberland. He hastened to meet the monster, slew him, and carried his head to King Athelstan at Lincoln. The fair Felice had now no scruple to marry the hero. But remorse for all the slaughter he had done merely for a woman's love began to seize him, and after 40 brief days of wedded happiness he left his home in the dress of a palmer to visit the Holy Land. Here he rescued Earl Jonas from his dungeon, and slew the ferocious giant Amiraunt, after which he returned to England to find Athelstan besieged in Winchester by the Danish Anlaf, of whose army the mainstay was the terrible Colbrand. Sir Guy, still in his disguise, after a prolonged and awful struggle, succeeded in striking off the champion's head. He now visited his wife all unknown in his palmer's weeds, and then retired to a hermitage at the place still called Guy's Cliff, near Warwick. Before his death he sent her parting ring as a token to Felice, and she arrived in time to close his eyes, survived him for but 15 days, and was buried in the same grave.

Guyon, Madame Jeanne Marie Bouvier de la Motte (gē-ôn′), a French mystic; the introducer in France of the system

of Quietism; born in Montargis, April 13, 1648. At the age of 16 she was married to Jacques Guyon, after whose death in 1676 the tendency to mystic enthusiasm which had characterized her younger years again acquired ascendancy, and she began the religious propagandism of her extreme views of self-abnegation, indifference to life and death, and even to future salvation or perdition. She became associated with some enthusiastic priests, abandoned her children and her goods, reserving a moderate annuity; and moved from place to place, making numerous proselytes. She also published numerous works, such as "The Song of Songs, Interpreted According to its Mystic Meaning" (1685); "Spiritual Poetry" (1685); "Christian and Spiritual Discourse" (1716), etc. At last the Archbishop of Paris thought it necessary to take steps against the spread of Madame Guyon's mystical doctrines. Through his influence she was shut up in the convent of the Visitation, but afterwards released at the instigation of Madame Maintenon, who herself became for a time a convert to the new doctrines, and allowed Madame Guyon to preach in the seminary of St. Cyr, where she made a convert and disciple of Fénelon. A commission of ecclesiastics, chief among whom was Bossuet, now sat in judgment, and the doctrines of Madame Guyon were condemned (1695). This led to her being imprisoned for some years, in the Bastille, whence she was liberated in 1702. She died in Blois, June 9, 1717.

Guyot, Arnold (gē′ō), an American geographer; born near Neuchâtel, Switzerland, Sept. 28, 1807; was the colleague of Agassiz at Neuchâtel in 1839–1848, and in 1848 accompanied him to the United States. Guyot delivered a course of lectures at the Lowell Institute, which were translated by Professor Felton, and published as "Earth and Man" (1853). In 1854 he was appointed Professor of Physical Geography and Geology at Princeton College. He had the management of the meteorological department of the Smithsonian Institution, where he more than once delivered courses of lectures, and in connection with which he published "Meteorological and Physical Tables." Guyot was joint-editor of "Johnson's Cyclopædia" (1874–1877), and his other works include several biographies, a "Treatise on Physical Geography" (1873), and a series of geographies and wall maps which are in general use in American schools. He died in Princeton, N. J., Feb. 8, 1884.

Guy's Hospital, a hospital in Southwark, London; founded by Thomas Guy (*q. v.*), who leased from the governors of St. Thomas's Hospital a large piece of ground, for a term of 999 years, at a ground rent of $150 a year. The first stone of the building was laid in 1722, and the hospital admitted its first patient in 1725, a few days after the death of its founder. The whole expense was $94,400, great part of which Guy expended in his lifetime, and he bequeathed $1,097,500 to endow it. Soon after his death an act of Parliament was obtained, regulating the management of the institution. In 1829 Mr. Hunt bequeathed to the hospital $950,000, and additional bequests to the amount of over $50,000 have since been received. The yearly average of patients is over 5,000; the out-patients relieved amount to above 80,000. The annual income is about $200,000, chiefly from estates in the counties of Essex, Hereford, and Lincoln.

Guzman Blanco, Antonio. See Blanco, Antonio Guzman.

Gvosdevi (gvos-dā′vē), a group of islands in Bering Strait, between North America and Asia, lat. 65° 40′ N., lon. 173° 50′ E. Imaglin, the largest, is 25 miles in length. They are low and destitute of vegetation.

Gwalior (gwä′lē-ôr), a native State of Central India, the dominions of the Mahratta Maharajah Sindhia; area, 25,041 square miles; pop. (1901) 2,933,001. Lying partly in the basin of the Jumna and partly in that of the Nerbudda, it divides its drainage between the Bay of Bengal and the Arabian Sea. The principal export is opium. Since 1803 the country has been under British protection. In 1843 the British were compelled, on the death of the sovereign, to send an armed force, which, after severe fighting, succeeded in restoring his adopted successor to the throne; and during the troubles of 1857 the young Maharajah remained faithful to the British government, though deserted by his troops.

Gwalior, a town, and capital of the State of Gwalior, 65 miles S. of Agra. Its nucleus is an isolated rock of about 340 feet in height, perpendicular on all sides, it measures 1½ miles by 300 yards, and its citadel, said to date from the 8th century, whose guns sweep the only approach, is virtually impregnable against any native force. Along the E. base of this eminence lies the old town of Gwalior, containing little worthy of notice but a beautiful mausoleum of white sandstone; and to the S. W. there extends for several miles the new town called Lashkar, where the Maharajah resides. Nearly 4 miles to the N. E. is Morar, the British cantonment from 1858 to 1886, when its fine sandstone barracks were handed over, along with the fortress, to Sindhia, and the European headquarters removed to Jhansi. Gwalior possesses two remarkable Hindu temples, and one of the most interesting examples of Hindu palace

architecture in India; while Jain caves and rock sculptures abound on all sides. Pop. (1901) 89,154.

Gwynn, Eleanor, better known by the name of "Nell," a celebrated mistress of King Charles II.; born in London about 1650. She was at first an orange girl, and also gained her bread by singing from tavern to tavern. About 1667 she became the mistress of Lord Buckhurst, who surrendered her about 1670 to the king. As mistress of the king she had an establishment, and was made lady of the privy chamber to Queen Catharine. She was merry and open-hearted, is said to have been faithful to Charles, mindful of old friends, and a liberal patroness of the poets Dryden, Lee, Otway, and Butler. From her are sprung the dukes of St. Albans. She died about 1690.

Gyges (gī′jēz), King of Lydia, who obtained the throne by murdering his master, King Candaules, and marrying his widow, about 687 B. C. Gyges reigned 34 years, during the course of which he wrested Magnesia and Colophon from the Ionian Greeks, lent assistance to Psammetichus in his revolt in Egypt against Assyria, and, after stoutly defending himself for some time against the Cimmerians, was at last slain by them in 654 B. C.

Gymnasiarch (jim-nā′zi-ärk), the officer among the Athenians who had charge of the schools, and provided for their management.

Gymnasium, the name given by the Greeks to the public building where the young men, naked or nearly so (hence the name, from *gymnos,* naked), exercised themselves in leaping, running, throwing the discus and spear, wrestling, and pugilism. This institution was established in most of the cities of Greece and in Rome under the Cæsars. Its objects, however, did not remain confined merely to corporeal exercises, but were extended also to the exercise of the mind; for here philosophers, rhetoricians, and teachers of other branches of knowledge delivered their lectures. In Athens there were five gymnasia, and among them the Academy, the Lyceum, and the Cynosarges. In the first, Plato taught; in the second, Aristotle; and in the third, Antisthenes. They were at first only open level places, surrounded by a wall, and partitioned off for the different games. Rows of plane trees were planted for the purpose of shade, which were afteward changed into colonnades with numerous divisions. The gymnasia, at last, were composed of a number of connected buildings, spacious enough to admit many thousands. Vitruvius has given an exact description of the arrangement of them in his work on architecture (v. 11). They usually contained the statues and altars of Hermes and Hercules, to whom the gymnasia were dedicated; sometimes, also, the statue of Theseus, the inventor of the art of wrestling; statues of heroes and celebrated men; paintings and bas-reliefs, representing subjects connected with religion and history. The Hermes figures (see HERMES) were among the most common ornaments of gymnasia. Here was assembled everything that could improve the youth in the arts of peace and of war; everything that could elevate their mental condition; and while these institutions flourished, the arts and sciences also flourished and the State prospered. In Rome

GYMNASTS.

during the republic there were no buildings which could be compared with the Greek gymnasia. Under the Cæsars the public baths or thermæ bore some resemblance to them; and the gymnasia may be said to have expired with the thermæ. (See GYMNASTICS.)

In Germany the name gymnasium is applied to a class of schools corresponding pretty nearly to grammar schools and public schools. Formerly in these schools Latin and Greek and the branches connected with antiquity were taught almost to the exclusion of other subjects; but a more practical bent is given to the course of instruction in these institutions now, though the real schools, as they are called, are the institutions specially established for high-class education in such branches as mathematics and physical science, history and modern languages. The gymnasia are the feeders of the universities, and the training adopted in them is specially intended to equip the pupils for entering these institutions. The last examination, to show whether the pupils are fit to enter the university, is very severe; the candidates have to write exercises on questions proposed to them in history, the Latin and Greek languages, mathematics, besides

themes in German, and in at least one foreign modern language. If private schools or (as is the case in several cities) orphan asylums wish to send scholars to the university, they must apply to government for commissioners to attend their examination. Persons who have fitted themselves for the university without attending a gymnasium or any school, can be examined by a committee appointed by the government which sits every half year.

Gymnastics, the technical term used to designate any system of exercises specially designed to promote the development of physical, and especially of muscular powers, Such exercises may be either general or special. Special exercises are those designed to train particular muscles, thus in singing or playing on musical instruments the muscles of the mouth and chest, and of the hand and arm, are specially exercised. In as far as these exercises are directly designed to promote the muscular development necessary for the purposes of art, they are truly gymnastic. In the apprenticeship of all trades there is likewise a muscular development which may be classed in the same way. Gymnastics proper are distinguished from all these species of applied gymnastics in this, that they consist in exercises designed to promote muscular development without regard to the particular uses to which the developed power may be applied. It may be remarked in passing, that singing, dancing, violin-playing, billiards, cricket, football, bowling, rowing, military exercises, and similar amusements, afford means of physical education or development all the more valuable that it is acquired insensibly, and that such pursuits are more likely to be persevered in than any set of formal exercises which have no interest in themselves. The special value of formal gymnastic exercises is that they are capable of being scientifically arranged so as to secure not only a general development of muscular power, but what is of even greater value, an accurate knowledge of the uses of the various muscles, contributing to the economy of muscular power on which health as well as successful exertion depends, and especially that they are capable of being applied to each individual case, so as to meet, allow for, and as far as possible overcome defects in physical organization. For these purposes an elementary course of gymnastics is of great value to all, especially to the sedentary student.

In regard to the economy of gymnastic exercises two general rules may be laid down, which will form an efficient guide in self-imposed exercises. The first is the universal rule in mechanics that the strength of any machine is the strength of its weakest part; the second is the fundamental law of muscular exercise, that it is exercise within the extreme power of the muscle which develops and improves, while straining weakens and injures, and excessive exercise develops particular muscles abnormally at the expense of the general health. It is quite possible, indeed, to carry physical exercise as a whole too far. The corruption of morals and consequent decline of political power among the Greeks has been attributed, though probably with exaggeration, to the excessive development of gymnastics in their national games. We do not need, however, to go further than our own universities and colleges to perceive that there are two extremes in this matter. A few overzealous or ambitious students may be found emaciating themselves with exhaustive application to mental toil, while, perhaps, a large number of jovial well-fed animals may be found at the opposite end of the academical scale, whose whole devotion is to physical pursuits, and who, but for the slight mental stimulus of acting as judges in their favorite games, would allow their brains to vegetate. Between these extremes is the healthful mean of the *mens sana in corpore sano,* which it is the aim of a sound mental and physical education to promote, and toward which gymnastics rightly used form an essential contribution.

The first or elementary stage of gymnastics, which should be practised by children of both sexes, consists in regular series of simple muscular movements without instruments; assuming poses or attitudes, saluting, making various flexures of the arms, legs, or body, rising on the toes, marching, etc. These exercises are performed at first slowly and carefully, afterward rhythmically to the word of command or the sound of music, such "musical drill" being now very common in schools. It is said that by a well regulated course of such exercises, without any accessories whatever, the strength of a boy may be doubled. These exercises form a necessary preparation for the gymnasium, in which, by means of complete apparatus and appliances, all the muscles of the body are regularly trained to their full development. Gymnasiums are fitted with such appliances as horizontal and parallel bars, trapezes hung from the roof, vaulting horses, ladders set horizontally and otherwise, climbing ropes and poles, weights to be raised by pulleys and ropes, besides such things as dumb-bells, bar-bells, Indian clubs, etc. There are now also pulling apparatus which may be fixed up in private houses and form a useful means of exercise at home. A gymnasium training is most effective when conducted by an experienced master. In default of this there are many useful little treatises which explain the various kinds of apparatus and give detailed directions for their use.

Gymnocladus (-klā′dus), a genus of leguminous plants, sub-order *Cæsalpinieæ,* tribe *Eucæsalpinieæ.* The only known spe-

cies is *G. canadensis*, sometimes called the Kentucky coffee tree, because the early settlers in that State used it as a substitute for coffee. The timber is suitable for cabinet work; the bark is very bitter, and contains saponine.

Gymnogens (jim′-), the sixth of the seven classes into which Lindley divides the vegetable kingdom. He places it between the dictyogens, and the exogens. It is not, however, the dictyogens, but the higher acrogens, like the *Lycopodiaceæ*, which approach them from below. In the other direction they are closely akin to exogens, agreeing in everything pertaining to their vegetation, in their concentric zones of wood, and in having a vascular system and spiral vessels and a central pith. The essential point in which they differ is that there is no pericarpal covering in the female flower, which receives fertilization through the foramen of the ovule without intervention of style or stigma. There are also large perforations or disks in the wood, a structure seen only in a few exogens. The gymnogens are often called gymnosperms or gymnospermous plants. The class contains four orders: *Cycadaceæ*, *Pinaceæ*, *Taccaceæ*, and *Gnetaceæ*.

The cryptogams and gymnogens or gymnosperms seem to have been brought into being and to have flourished long prior to the monocotyledons and dicotyledons; all the supposed palms, arads, and other monocotyledons of the Carboniferous period having been explained away. Apparently true gymnogens exist in the Devonian rocks. Dadoxylon, which is from them, seems a conifer, and that order was well represented in the Carboniferous period. Cycads also occurred, and perhaps taxaceæ.

Gymnosophist (nos′ō-fist), a name for the sophists, the first of seven classes of Indian society described by Arrian, a writer of the 2d century, whose descriptions, however, were founded on the authority of Alexander the Great's companions in arms, and on that of Megasthenes. According to Arrian, the sophists went naked (whence the name Gymnosophists), in winter basking in the sun, and in summer sheltering themselves under trees so umbrageous that they could shelter 10,000 men. Arrian identifies the sophists with the Brahmans, as do Ambrose and others. But as the position of sophists was open to all classes of the community, and as the sophists ate with others, it is probable that they were Hindu Sunyasis or other ascetics, or Buddhists free from the restraints of caste.

Gynæcology (jin-ē-kol′ō-ji or gī-nē-), that branch of medicine which treats of the diseases of women.

Gynæocracy (jin-ē-ok′rä-si), a term used to indicate that state in which women are legally permitted to assume the reins of government. It is used by way of contradistinction to the "Salic law," which precludes them from the privileges of sovereignity. There are only five states in Europe to which the operation of the Salic law does not extend, England, Russia, Spain, Portugal and Denmark.

Gyp, pseudonym of Countess Gabrielle de Martel de Janville, a French novelist; born in the Château de Koëtsal, Morbihan, about 1850. She is the creator of several new types, among them Paulette, Loulou, Bob, etc.; and has been a prolific writer. Among her numerous works are: "About Marriage" (1883), dramatized the same year; "About Divorce" (1886); "Conjugal Joys" (1887); "Miss Eve" (1889); "The Duke" (1892); and "The Duchess" (1893).

Gypseous Series, in geology, the lower freshwater limestone and marl constituting the Upper beds of the Middle Eocene in the vicinity of Paris, France. They are of white and green marls with subordinate beds of gypsum. At the Hill of Montmartre is a quarry of gypsum valuable for the manufacture of plaster of Paris. Splendid fossil remains of Eocene mammals have been found in it. The examination of these by Cuvier, and the evidence thus afforded that they were of extinct genera and species, constituted an epoch in the history of geology. Similar gypseous marls are worked for gypsum at St. Romain, on the right bank of the Allier.

Gypsies. See Gipsies.

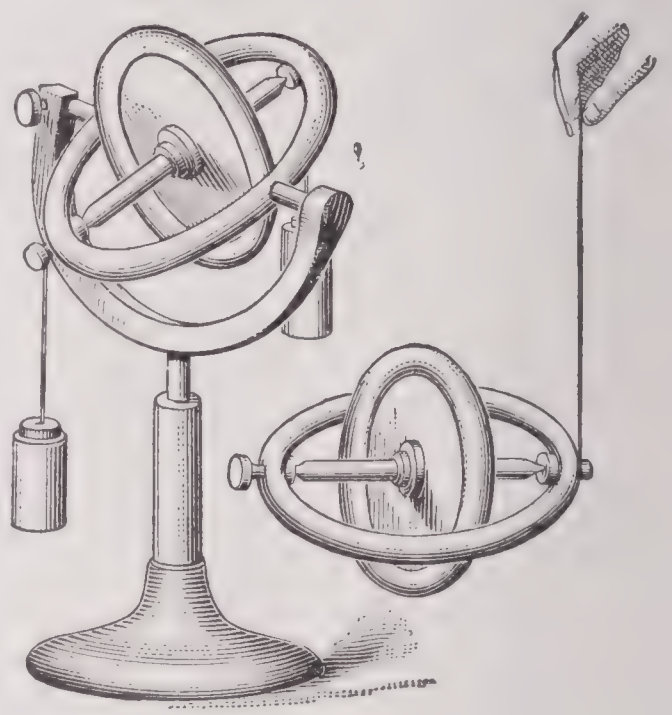
Gypsum, calcium sulphate crystallized with two molecules of water $CaSo_4 \cdot 2H_2O$. It is often found by the decomposition of pyrites when lime is present. Gypsum calcined is called plaster of Paris, and is used for taking casts of statues. It has been found that the addition of potassium sulphate causes it to harden more quickly. Gypsum is used as a manure; it facilitates the decomposition of rocks containing alkaline silicates.

Technically gypsum is regarded as a mineral deposit, in some places constituting rock masses. It may be of any age. Near Paris it is Middle Eocene. Frapoli says that some gypsums were originally carbonates instead of sulphates of lime, and that they underwent metamorphism by the action of volcanic sulphurous or sulphurohydrous vapors. The production of gypsum in the United States in 1899 was 428,661 short tons, valued at $1,036,860. The principal producing States were: Michigan, New York, Iowa, and Kansas. The United States ranked second to France in the world's production.

Gyrogonite (ji-rog′ō-nīt), the sporangium, or seed-vessel, of the flowerless plant-genus *Chara*. It is very rough and hard, consisting of a membranous nut, covered by an integument, both of which are spirally streaked or ribbed. The integument is composed of fine spiral valves of a quadrangular form. The number of spiral rings varies in different species of *Chara*, but are constant in each.

Gyroscope (jir′ō-), an instrument constructed by M. Foucault to make the rotation of the earth visible. The principle on which it proceeds is this — that, unless gravity intervene, a rotating body will not alter the direction in which its permanent axis points. In the gyroscope there is a rotating metallic disk, the middle point of whose axis is also the center of gravity of the machine. By this device the action of gravity is eliminated. The instrument, moveover, is so constructed that the axis of rotation can be made to point to some star in the sky. Then, as the heavy disk whirls round, it is found that the axis continues to point to the moving star, though, in consequence of this, apparently altering its direction relatively to bodies on the earth. If, again, the axis be pointed to the celestial pole, which is fixed, no alteration in its position relative to bodies on the earth takes place. The only feasible explanation of these appearances is that the earth is revolving on its axis.

Gyulai, Pál (jö′lī), a Hungarian poet; born in Klausenburg in 1826. He began as a journalist. Later he was made Professor of Hungarian Literature at the University of Budapest. His works include "The Life of Vörösmarty," "Memorial Addresses," and many literary studies and criticisms. His collected poems appeared in 1867, in a



GYROSCOPE.

volume entitled "Sketches and Pictures." For many years past he has been at work upon a satirical poem scathing the present age and its follies, called "Romhányi" and modeled upon Byron.

H

h, the eighth letter and sixth consonant in the English alphabet, having as its most proper and distinctive sound that which is heard in such words as hart, hat, when, what, etc. In Latin and ancient Greek it was not considered as a true consonant, but merely as a breathing. The latter language, as is well known, had no literal sign for our h, but merely what is called the rough breathing (') ; and in Latin prosody, when initial, it is not considered as a letter. The character H did exist in Greek, but in the ordinary written language it represented the long sound of e (much as in there) ; at an earlier period it was an aspirate, and as such was introduced into the Latin alphabet. An erroneous aspiration early crept into the Latin, of which Cicero complains and on which Catullus made an epigram. The spelling *pulcher, triumphus*, etc., was thus substituted for *pulcer, triumpus*, etc. In languages in which h is considered a consonant it is generally classed with the gutturals. To represent the sound heard in hard, etc., is only a small part of the duty this letter has to perform in English; it is also very commonly joined to other consonants to represent sounds for which there are no special letters in our alphabet, as in the digraphs ch, sh, th (child, ship, thin, this), or in other consonantal combinations of various origins and values as in the words enough (where gh now is equivalent to f), plough (gh now silent), philosophy (ph = f), rhetoric (h silent), etc. Ph and rh are found only in words that are borrowed or derived from the Greek and Latin. Ch is also common in words taken from the Greek, but in this case it usually has the sound of k, as in chemistry, chyle, etc. In the earliest English (Anglo-Saxon) h appears to have been distinctly guttural, and to have more or less resembled the German ch. In many words formerly spelled with the guttural h alone we now find the letter strengthened by a g before it, as in night (Anglo-Saxon *niht*), thought (Anglo-Saxon *thóht*). In Anglo-Saxon it frequently occurs at the beginning of a syllable before **l, n,** and r, positions from which it has long disappeared. The Italians have almost entirely banished h as an independent letter; they leave it out at the beginning of words, with few exceptions, because it is not pronounced; and instead of ph they write f. In French it is common in the combination ch; occurring by itself it has no sound, but in various cases it causes a hiatus between vowels. H, among the Greeks, as a numeral, signified 8; in the Latin of the Middle Ages 200, and H with a dash over it 200,000.

Haakon VII. (PRINCE CHARLES OF DENMARK), King of Norway; born in Copenhagen, Aug. 3, 1872; second son of King Frederik of Denmark; was elected king, on the separation of Norway and Sweden, Nov. 18, 1905; crowned June 22, 1906. He married the Princess Maud, daughter of King Edward VII., on July 22, 1896. His son and the heir-apparent is Prince Alexander, born July 2, 1903, and renamed Prince Olaf on his father's accession to the throne.

Haarlem (här'lem), a town of Holland; 10 miles W. of Amsterdam; is intersected, like most Dutch towns, with canals and avenues of trees. Its principal church is the Great or St. Bavon's, a Late Gothic basilica, built in the 15th century, one of the largest churches in Holland, and specially noted for its lofty tower and its organ (1738). Before the church stands a statue of Laurens Coster, to whom his countrymen ascribe the invention of printing. The town hall, formerly the residence of the Counts of Holland, has portraits by Franz Hals, and a valuable collection of early printed works. The Teyler Institution promotes the study of theology, natural science, and the fine arts. Though Haarlem is no longer celebrated, as in the 17th century, for its flourishing trade, it still weaves cotton, casts type, bleaches linen, and carries on an extensive trade in flowers, especially in tulips, hyacinths, and other bulbs. It was a flourishing town as early as the 12th century, when it took an important part in the wars between the Hollanders and West Frisians. At the close of the 15th century it was deprived of its privileges by Albert of Saxony, and it suffered severely during the revolt of the peas-

antry (1492). During the war of independence it underwent a seven months' siege (1572-1573) from the Spaniards, in which the citizens displayed the noblest heroism. The wood of Haarlem is a favorite place for recreation; in it stands the pavilion, which contains the colonial and industrial museums and a collection of modern pictures. Pop. (1906) 68,997.

Haarlem, Lake of, a former lake of Holland, adjoining and communicating with the Ij, between Haarlem and Amsterdam. It was about 12 miles long by 7 miles broad and formed a shallow expanse with 6 feet of water and 8 feet of mud. Previous to the 15th century it existed only as a swamp of considerable extent near its present center, but toward the end of the 16th century had grown into a large lake, and was only restrained by strong dykes from making further encroachments. The draining of it was commenced in 1840 and completed in 1853, and 45,000 acres of fertile land recovered. The soil thus reclaimed now forms a commune, which numbers about 16,000 inhabitants.

Habakkuk (ha-bak'uk or hab'a-kuk), in the Old Testament, the eighth of the minor prophets. It was composed when the Chaldean invasion was imminent, probably in the early part of the reign of Jehoiakim, about 610 B. C. The prophet's poetic genius is of a high order, the third chapter of his work being one of the finest compositions in the whole Old Testament. Nothing is known of the writer's history. Several passages are quoted in the New Testament, the thrice repeated doctrine that "the just shall live by faith" (Rom. i: 17; Gal. iii: 11; and Heb. x: 58), which excited so powerful an influence on Luther's mind, being derived originally from Hab. ii: 4. Hab. i: 5, is quoted in Acts xiii: 40, 41.

Habana. See HAVANA.

Habberton, John, an American journalist; born in Brooklyn, N. Y., Feb. 24, 1842. After service in the Civil War he became literary editor of the "Christian Union" (1874), and editorial writer on the New York "Herald" (1877). His best known novel is "Helen's Babies" (1876), of which over 150,000 copies were sold. Among the others are: "The Barton Experiment" (1876); "The Worst Boy in Town" (1880); "Mrs. Mayburn's Twins" (1882); "Who was Paul Grayson?" "Brueton's Bayou"; "Grown-Up Babies"; "With the Dream-maker" (1898); "Poor Boy's Chances."

Habeas (hā'bē-as) **Corpus,** in law, a writ (more fully *habeas corpus ad subjiciendum*) directed to the person detaining another, and commanding him to produce the body of the prisoner, with the day and cause of his caption and detention, *ad faciendum, subjiciendum, et recipiendum,* to do, submit to, and receive whatsoever the judge or court awarding such writ shall consider in that behalf. It is applicable in all cases where a person in custody claims to be illegally detained, or wrongfully refused bail, or who desires to be removed from one court to another. The Habeas Corpus Act has been substantially incorporated into the jurisprudence of every State in the Union, and the right to the writ has been secured by the constitutions of most of the States, and the United States. The Constitution of the United States, art. 1, sec. 9, par. 2, provides, that "the privilege of the writ of *habeas corpus* shall not be suspended, unless when, in cases of rebellion or invasion, the public safety may require it." A similar provision is contained in many of the State constitutions.

Habit, a tendency or aptitude for the performance of certain actions, acquired by custom, or a frequent repetition of the same act. Animals as well as mankind and to some extent plants even are influenced by this force, which in many cases becomes so strong as to deserve the proverbial phrase of being second nature. The parrot can be taught to repeat words and even sentences, the horse will stop without being pulled up at places where his master has accustomed him to halt. Man is in a greater measure than is usually recognized, regulated by habit. He becomes attached to the people and the scenes with which he has been long surrounded. It is extremely probable that the closest affection of one relation for another may be the result of habit, rather than of the ties of blood. The child early separated from its mother will in course of time cling to its nurse and look upon its parent with indifference. Viands and beverages which are repugnant to the taste when first partaken of, become afterward intensely enjoyable. The most daring feats of the gymnast, the most brilliant execution of a musician, have resulted from so frequent repetitions of the same actions that the will seems to count for nothing and the mere machine for everything. Man, so proud of his title of reasoning animal, is rather inclined to overlook the importance of habit which seems to reduce him to the level of a machine. If every action and circumstance of everyday life required the effort and reflection they did at the outset, he would not be able to accomplish but an infinitesimal part of the work he does, and it is questionable if that fractional part would be done better than the whole now is. His principal object should be to acquire good habits, and it seems impossible to insist too strongly or frequently on the importance of early training in this respect.

Hachette, Jeanne (ä-shet′), a heroic young Frenchwoman; born in Beauvais, Nov. 14, 1454. She inspired and led on a troop of armed women to encounter Charles the Bold in 1472, when he attacked their city. When the walls were stormed she slew a standard-bearer who led the assault, as he was about to plant the trophy on the rampart, and hurled the body into the moat, at the same time setting her foot on the standard. In memory of this act, and for her gallant services, the inhabitants have for ages held a procession July 10, in which the women take precedence of the men; and further, to mark their admiration, her descendants were for ever exempted from the payment of taxes.

Hachette, Louis, a French publisher; born in Rethel, Ardennes, France, May 5, 1800. In 1826 he established in Paris a publishing business, principally with the intention of issuing books calculated to improve school teaching and elevate the general intelligence. In pursuance of his plan he published several series, as the "Popular Library," "Varied Library," etc., which have done useful service in disseminating information and amusement among the people. He was also a friend of the working classes, and the promoter of international copyright. He died July 31, 1864.

Hachure, in engraving, etc., short lines employed to represent half-tints and shadows, as in representing mountains on maps. Simple hachures are those in which the lines, whether curved or straight, are all parallel; double hachures are those in which the lines cross each other.

Hackee, or **Chipping Squirrel, The,** one of the most familiar of North American quadrupeds, found in great numbers in almost every locality. It is a truly beautiful little creature, and deserving of notice both on account of the dainty elegance of its form and the pleasing tints with which its coat is decked. The general color of the hackee is usually a brownish grey on the back, warming into orange-brown on the forehead and the hinder quarters. On the back and sides are drawn five longitudinal black stripes and two streaks of yellowish white, so that it is a most conspicuous little creature, and by these peculiar stripes may easily be distinguished from any other animal. The abdomen and throat are white. It is slightly variable in color according to the locality in which it exists, and has been known to be so capricious of hue as to furnish specimens of pure white and jet black. Its fur is extremely elegant and if it were not quite so common would long since have taken nearly as high a rank as sable or ermine. The length of the hackee is usually about 11 inches, the tail being about 4½ inches in length.

Hackel, Ernst H. See HAECKEL.

Hackensack, a city and county-seat of Bergen co., N. J., on the Hackensack river, and on the New York, Susquehanna, and Western, the New York, Ontario, and Western, the New Jersey and New York, and the West Shore railroads; 14 miles N. W. of New York city. It is a residential city, but has brick, silk, and other manufacturing interests. There are a court house, public library, public high school, daily and weekly newspapers, gas and electric lights, waterworks, electric street railways connecting with surrounding towns and cities and with New York, and an assessed property valuation of over $5,000,000. Hackensack was settled by the Dutch in the latter part of the 17th century, and during the Revolution was occupied in turn by the British and American armies. Pop. (1890) 6,004; (1900) 9,443 (1910) 14,050.

Hackett, Horatio Balch, an American clergyman; born in Salisbury, Mass., Dec. 27, 1808. He was one of the committee of New Testament revision, and with Ezra Abbot edited the American edition of Smith's "Bible Dictionary" (1868-1870). His chief work was a "Commentary on Acts" (1851); besides which he wrote "Memorials of Christian Men in the War" (1864); "Tour in the Holy Land" (new ed. 1882); etc. He died in Rochester, N. Y., Nov. 2, 1875.

Hackett, James Henry, an American actor; born in New York city, March 15, 1800. He was particularly successful in impersonating Yankees and Westerners, but was best known by his Falstaff, which he played first about 1832. He wrote "Notes and Comments on Shakespeare" (1863). He died in Jamaica, N. Y., Dec. 28, 1871.

Hackländer, Friedrich Wilhelm von (häk′len-der), a German novelist and comedy writer; born in Burtscheid, near Aix-la-Chapelle, Prussia, Nov. 1, 1816. After one or two false starts in life he commenced his literary career with "Pictures of Soldier Life" (1841); three years later followed "Soldier Life in Peace" (9th ed. 1883). Baron von Taubenheim invited him to accompany him on his travels to the East, and the literary fruits of this journey were "Daguerreotypes" (1842), and "Pilgrimage to Mecca" (3d edition 1881). In 1843 he was appointed private secretary to the crown-prince of Würtemberg, with whom he traveled in the succeeding years. In March, 1849, he went to Italy, was present with Radetzky's army during the campaign in Piedmont, and afterward published "Soldier Life in War" (1849-1850). From 1859 onward he lived for the most part in Stuttgart, partly also at Leoni on Lake Starnberg, near Munich. The best of his longer novels

are "Trade and Traffic" (3d ed. 1869), "Eugene Stillfried" (1852), and "Anonymous Histories" (1851). His best comedies are the "Secret Agent" (1850), which has been performed on all the stages of Germany, and translated into several European languages, and "Magnetic Cures" (1851). With Zoller he started the illustrated magazine, "Over Land and Sea." He died in Leoni, July 6, 1877.

Hackle, a board set with sharp steel spikes for combing or pulling out hemp or flax to dispose the fibers in parallelism, and to separate the tow and hards from the finer fibers. The teeth are of steel from 1 to 2 inches in length, and very sharp. They are arranged in quincuncial order upon a board. The lock of flax is seized by the middle, and one end is thrown over the teeth and drawn through. One end being hackled, the other end is turned to the comb and similarly treated. This separates the ribbons of fiber, removes any remaining traces of the boon or cellular matter, and divides the fiber into two portions, the short and the long, the tow and the line. The process is repeated on a fine hackle whose teeth are more numerous and thickly set. The produce is from 40 to 60 per cent. of fine flax or line. Also any flimsy substance unspun; as, raw silk, etc.; a long shining feather on a cock's neck; a fly for angling, dressed with a feather from a cock's neck.

Hackmatack, a term applied in many parts of the United States to the American larch.

Hackney, a parish of Middlesex, England, now forming a suburb of London, and 3 miles N. N. E. of St. Paul's. It was at one time a favorite suburban residence of London citizens. In its earlier and fashionable days it is by some said to have given its name to hackney coaches. See CABS.

Hackney Coach, a coach let out for hire. Hackney coaches began first to ply under this name in London in 1625, when they were 20 in number. Hackney coachmen in England are generally put under police regulations, and a tariff of fares imposed on them. Cabs are now the common kind of hackney coaches.

Haco (or **Haakon,** or **Hakon**) **V.,** surnamed THE OLD, King of Norway. He acceded to the throne in 1217, and during his reign Greenland and Iceland were added to Norway. He died in the Orkneys, on his way home from Scotland, where he had fought the battle of Largs (1263) against Alexander III., in which Haco was defeated.

Haddington, the county town of Haddingtonshire, Scotland, at the S. base of the Garleton Hills, on the Tyne, 17 miles E. of Edinburgh. Its Abbey Church, the Lucerna Laudoniæ or "Lamp of Lothian," is a cruciform Decorated red sandstone pile, with a central tower 90 feet high, and ruinous all but the nave, which serves as the parish church. There are also the county buildings (1833), the large corn exchange (1854), the town hall (1748-1831), the county lunatic asylum (1866), and a school, the Knox Memorial Institute (1880). Haddington's worthies have been Knox, John Brown and Samuel, his grandson, Samuel Smiles, and Jane Welsh Carlyle; its chief memories have been perils by flood and fire, and the great siege of the English by the Scotch in 1549.

Haddock (*Gadus æglefinus*), a fish of the same genus with the cod, and much resembling it in general appearance. The number of fins is the same, there being three dorsals and two anals. The haddock, like the cod, has a barbule at the point of the lower jaw. The haddock is brown on the back, silvery on the belly; the lateral line is black, and there is a black spot behind each of the pectorals, these spots sometimes extending so as to meet on the back. An ancient legend ascribes these spots to the finger and thumb of St. Peter, and states the haddock to be the fish from the mouth of which he took the tribute money. The haddock is not found in the Mediterranean. Nor does it enter the Baltic, though plentiful in the N. parts of the Atlantic Ocean, both on the European and the American coasts. On the British coasts it is abundant almost everywhere, appearing in great shoals at particular seasons. Those of the E. coast and particularly those caught in deep water, are in great esteem, and those of Dublin Bay are remarkable for their large size. It is taken both by trawl nets and lines. The usual bait for the long lines used to catch this fish on the E. coast of Great Britain is mussel. The haddock, when really of good quality, is perhaps the finest of all the *Gadidæ;* and the numbers taken on some parts of the British coasts are very great, rendering it, from an economical point of view, a very important fish. It does not "take salt" so well as the cod, but is often cured by drying and smoking. In March and April the haddock is out of season; in October, November, December, and January it is in finest condition.

Haden, Francis Seymour, an English etcher and surgeon; born in London, England, Sept. 16, 1818. In 1857 he was elected a Fellow of the Royal College of Surgeons. His etching was undertaken as a relaxation from professional labors. The "Etched Work of F. S. Haden" contains 185 plates from his hand; others have been published. The chief qualities of his work are vigor and breadth. He was president of the Society of Painter Etchers, and wrote

"Etched Work of Rembrandt" (1879–1880), "Lectures," and "About Etching" (1881). He died June 1, 1910.

Hades (hā′dēz), in Homer the Greek word Ades figures as the name of a god, in large measure corresponding to the Roman Pluto. After Homer it becomes a place to which the dead go. Both Greeks and Romans supposed the infernal regions to be in the center of the earth. To enter these, in the Roman opinion, the river Styx had to be crossed by the spirits of the dead, Charon, the ferryman, for a very small sum, rowing the boat. If, by any misfortune the body had been unburied, the soul had to wander 100 years on the banks of the Styx before it was taken across. Pluto was the king of the spirit world, Rhadamanthus its most noted judge.

HADES.

In the Jewish belief, the place of the dead; the Hebrew *sheol*, which occurs 65 times in the Hebrew Bible, and in 61 of them is rendered in the Septuagint *Hades*. In the Authorized Version of the English Bible it is translated in the Old Testament 31 times by "grave," 31 times by "hell," and 3 times by "pit." The ancient Hebrews conceived of Sheol as situated below, so that souls had to "go down" or descend before entering it (Num. xvi: 30, 33; Job xvii: 16; Psalm ix: 17; Prov. i: 12; Isa. xiv: 15; xxxviii: 18), as "very deep" (Job xi: 8), as "dark" (x: 21-22), as having different floors or stories (Ps. lxxxvi: 13, lxxxviii: 6), as having "gates" (Isa. xxxviii: 10), and "bars" (Job xvii: 16), as inhabited by the souls of those who have already died (Isa. xiv: 9), etc.

In Christian doctrine, one of the two words rendered in the Authorized Version by the ambiguous term HELL (*q. v.*). Expressions, most of them obviously figurative, used of Hades represent it as situated beneath (Matt. xi: 23; Luke x: 15), as having gates (Matt. xvi: 18), with keys in the hand of Christ (Rev. i: 18), and as having in a portion of it souls in torment (Luke xvi: 23).

Hading, Jane (ä-dan′), a French actress; born in Marseilles, France, Nov. 25, 1859. She went on the stage in early childhood, and toured the United States in 1885. Her best rôles are in such pieces as "The Forge Master"; "Marriage"; etc.

Hadith, the traditions about Mohammed the Prophet's sayings and doings, which, as complementary to the Koran, form with it the supreme authority for all religious and legal questions of the Mohammedans. Originally it was not allowed to commit them to writing, but the danger of their being entirely forgotten in the course of time led to their being written down in the first centuries after Mohammed. Those who, notwithstanding, know them well by heart are honored by the title of Hafiz (retainer, keeper). The most important code is the "Sahih" of Bochari, who, it is said, spent 16 years in traveling through the land collecting such traditions, and who singled out from a number of 60,000 about 7,270 as all that were genuine.

Hadji (hä′jē), the title of a Mohammedan who has made a pilgrimage to Mecca, a religious act which every true believer is bound to perform at least once in his life; though minors, slaves, and lunatics are exempt. Hadji is the name of the celebration which takes place on the arrival of the caravans of pilgrims at Mecca, and a Mohammedan who has made the pilgrimage commonly bears for the rest of his life the title of hadji prefixed to his name. As is well known, presence at these ceremonials is strictly prohibited to all but the faithful; but at least five European Christians are known to have been present at these ceremonies; the last two of these were the celebrated travelers Burckhardt (in 1814) and R. F. Burton (in 1853), both of whom have published interesting accounts of their journeys.

Hadji Khalfa (käl′fä), the surname of MUSTAPHA-BEN-ABDALLAH, a Turkish historian; born in Constantinople about 1605. He became first secretary to Sultan Murad IV. His most important work is "Keshf-ul-tzunûn," a kind of encyclopædia of Arabic, Turkish, and Persian literature. Among his other works are "Chronological Tables," "Mirror of the World," "History of the Maritime Wars of the Turks" All the works mentioned have been translated into Latin or modern languages. He died in Constantinople in 1658.

Hadlaub, Johann (häd′loub), a German writer of minne or love songs; flourished about 1400; and lived mostly in or near Zürich. His poetry is of special historical value as affording our sole insight into some customs of private life and the way they were then viewed. Harvests and autumn scenes also afford him themes for attractive lines.

Hadleigh (had'li), a quaint old market town of Suffolk, England, on the Bret, 9½ miles W. of Ipswich. Its chief buildings are the brick Rectory Tower (1495) and the noble parish church, with a spire 135 feet high. Formerly, from 1331, an important seat of the cloth trade, Hadleigh was the scene of the death of the Danish king Guthrum (889), of the martyrdom of Dr. Rowland Taylor (1555), and of the conference (1833) out of which grew the "Tracts for the Times."

Hadley, Arthur Twining, an American educator; born in New Haven, Conn., April 23, 1856; was graduated at Yale College in 1876; was Professor of Political Science at Yale University in 1886-1899, and was then elected its president. In 1910 President Taft appointed him chairman of a commission to investigate the control of securities by concerns engaged in interstate commerce. Chief works: "Economics, an Account of the Relations Between Private Property and Public Welfare"; "Railroad Transportation, Its History and Laws"; and "Report on the System of Weekly Payments."

Hadley, James, an American philologist; born in Fairfield, N. Y., March 30, 1821. He was graduated at Yale in 1842, was for six years tutor and assistant professor there, and Professor of Greek from 1851. He was one of the American committee for the revision of the New Testament. He published a Greek grammar and "Elements of the Greek Language" (1869); after his death a volume of lectures on Roman Law appeared, and a series of "Philological and Critical Essays" (1873; edited by Prof. W. D. Whitney). He died in New Haven, Conn., Nov. 14, 1872.

Hadley, John, an English mathematician, the inventor of Hadley's quadrant and of a reflecting telescope; born April 16, 1682. The honor of having invented the sextant is claimed for Hadley, Godfrey, and Newton. Each seems, however, to have made his own discovery independently. Hadley described his instrument, which he called an "octant," to the Royal Society on May 13, 1731. He died Feb. 14, 1743.

Hadramaut, or **Hadhramat,** a division of South Arabia, bounded W. by Yemen, N. by the great desert of El Ahkaf or the billows of sand, N. E. by Omân, and S. E. by the ocean. It is evidently the Hazarmaveth of Scripture (Gen. x: 26), peopled by the posterity of Joktan (Yoktan or Kahtan). The name Hadramaut is an ancient territorial appellation — the connection of which with the political divisions of the country has long since passed away; and at the present day its application is confined to narrower limits than those which, on the authority of Arab geographers, have been stated above. Mahrah, or the country of the Mahrí, extending from Keshín N. E. along the coast, is no longer included in it; and the limits of modern Hadramaut along the coast, though limits in Arabia are nowhere fixed with precision, may be said to be, W., the Bay of Ghubbet-Ain, lon. 48° E.; and E., Sihút, lon. 51° 20′. Thus limited, Hadramaut has, on the seashore, a length of about 200 miles; but there are some who restrict the name to a tract extending only about 60 miles in length from Makallah E. Immediately behind the coast rises a chain of mountains which reaches a height of from 4,000 to 6,000 feet. The hills near the sea are of limestone, but the main range is probably granitic; farther in the interior, possibly from 60 to 70 miles in a straight line from the coast, commences a table land 8,000 feet in height, and covered with fine sandstone. It is in the valleys and glens of this plateau that the fertile spots are found which gave rise to the fame of Hadramaut. The most important of these valleys is Wadi-Doom, 30 geographical miles in length, and from 5 to 6 in breadth. On the slopes of the mountains, towns and villages rise contiguously in the form of an amphitheater, and grain crops, dates, bananas, melons, cucumbers, indigo are extensively cultivated. The only place of any note on the coast of Hadramaut is Makallah, which is indeed the chief commercial depot of the S. coast of Arabia. The inhabitants, Hadarémí, of the present day, retain many traces of their ancient history and civilization. Like their ancestors, the Chatramotitæ or Chatramonitæ of Greek and Roman writers, they are still renowned for courage as well as for commercial enterprise. Hadramaut exports frankincense, myrrh, aloes, and dragon's blood. The region is under the rule of several independent sultans. Pop. about 150,000.

Hadrian, Publius Aelius. See ADRIAN, PUBLIUS AELIUS.

Hadrian's Wall, a wall in the N. of England, sometimes called the Wall of Severus, though it is commonly believed to have been built by the Roman emperor Hadrian to protect the province from the barbarous tribes of the North. Considerable portions of it still remain.

Hadrosaurus, a genus of dinosaurian reptiles, found in the Cretaceous rocks of North America, and representing the iguanodon of the Old World.

Haeckel, Ernst Heinrich, a German naturalist and Darwinian; born in Potsdam, Prussia, Feb. 16, 1834. He studied natural science and medicine at Würzberg, Berlin, and Vienna under Müller, Virchow, and Kölliker. After working for a while at Naples and Messina, he became a privatdocent in the university of Jena in 1861, a professor extraordinary in 1862, and

an ordinary Professor of Zoölogy in 1865. In 1910 he withdrew from the Church as a protest against reactionary tendencies. Works: "On the Division of Labor in Nature and Human Life" (1869); "On the Origin and Genealogy of the Human Race" (1870); "Life in the Great Marine Animals" (1870); "The Arabian Corals," (1873); "The System of the Medusa" (1880); and "A Visit to Ceylon."

Hæmal Arch, in anatomy, an arch formed by the projection forward of the ribs and the sternum to protect the heart, etc.

Hæmal Canal, in anatomy, a canal surrounding the central concavity of a vertebra.

Hæmal Cavity, the cavity containing the heart, the great arteries, etc., with the respiratory and digestive apparatus.

Hæmal Septum, in anatomy, a septum in man partly constituting the linea alba, and elsewhere separated into two, as an investment of the visceral cavity forming the transversalis, iliac, and pelvic fasciæ.

Hæmanthus, a genus of *Amaryllidaceæ*, tribe *Amarylleæ*. The Hottentots are said to poison their arrows by dipping them in the viscid juice of the roots of *H. toxicarius*.

Hæmatein (hē′ma-tīn), in chemistry, $C_{16}H_{12}O_6$, a substance obtained by exposing a solution of hæmatoxylin in ammonia to the air, and decomposing the ammonium salts thus formed by acetic acid. It is a red-brown powder, which gives a blue solution when dissolved in potash.

Hæmatemesis (-tem′e-sis), blood effused into the stomach, and thence rejected, differing thus from HÆMOPTYSIS (*q. v.*), hæmorrhage from the lungs. It is more frequent in later life than hæmoptysis, but may occur in the acute perforating ulcers of the stomach in young women. It is frequently associated with cancer, and other ideopathic diseases, but is also traumatic, especially from external violence.

Hæmatin, in chemistry, $C_{34}H_{34}FeN_4O_5$, the coloring matter of the blood. It contains nearly 9 per cent. of iron. Obtained by the acute action of dilute acids, alkalis, and hæmoglobin, which is decomposed into hæmatin, albuminoids, and fatty acids. Hæmatin is a dark powder, but can be obtained in crystals.

Hæmatinone (-mat′in-ōn), a red glass known to the ancients, and used for mosaics, ornamental vases, etc.; it is mentioned by Pliny and occurs frequently in the ruins of Pompeii. Its fine red color, intermediate between red-lead and vermilion, is due to red oxide of copper, and is completely destroyed by fusion. Hæmatinone is opaque, harder than common glass, has a conchoidal fracture, and a specific gravity of 3.5. It contains no tin and no coloring matter except cupreous oxide.

Hæmatite, a mineral consisting chiefly of peroxide of iron; a valuable iron ore. There are two principal varieties, red hæmatite and brown hæmatite. See IRON.

Hæmatopodinæ (-mat″o-pō-dī′nē), in ornithology, oyster catchers; a sub-family of *Charadriidæ* (plovers).

Hæmatopus (-mat′o-pus), in ornithology, the typical genus of the sub-family *Hæmatopodinæ*; the bill is long, very straight, contracted in the middle, and wedge-shaped at the tip; the feet are three-toed.

Hæmatoxylin (-oks′i-lin), in chemistry, $C_{16}H_{14}O_6$, also called hematin, a crystalline substance contained in logwood. It is soluble in hot water, alcohol, and ether. It crystallizes in pale yellow prisms, containing three molecules of water. It is the coloring matter of logwood. Hæmatoxylin, fused with caustic potash, yields pyrogallic acid.

Hæmatozoa (-zō′ä), any living microorganisms occurring in the blood; as, the *H. malariæ*, or parasites of malaria.

Hæmaturia (-ū′rī-ä), the discharge of blood with the urine, usually from disease of the kidney or bladder. It is rather a symptom than a disease, and, though always of some gravity, it is not very often directly fatal. Where it is necessary to treat the symptom itself complete rest is very important; the bowels may be required to be freely moved; and styptics, such as ergot or perchloride of iron, may be taken by the mouth, the former in 30-drop doses of the liquid extract, the latter in 20-drop doses of the tincture, every two or three hours.

Hæmodoraceæ (-ā′se-ē), in botany, bloodroots; an order of endogens, alliance *Narcissales*. It consists of herbaceous plants, with fibrous perennial roots and permanent sword-shaped equitant leaves; perianth generally woolly; the calyx and the corolla undistinguishable; adherent stamens three or six; ovary generally three-celled, each cell one, two, or many-seeded; fruit capsular. They occur in South America, the Cape of Good Hope, Australia, etc. Described species 13, known species 50. The order is divided into three tribes, *Hæmodoreæ, Conostyleæ,* and *Velloziеæ*.

Hæmoglobin (-glō′bin), an albuminoid substance which forms the chief part of the red corpuscles of the blood of vertebrata. The defibrinated blood is mixed with dilute alcohol; after 24 hours the hæmoglobin separates out in violet-red rhombic octohedra. It is soluble in water, forming a red solution, and is reprecipitated by alcohol.

The aqueous solution of hæmoglobin has two absorption bands in its spectrum, by which the presence of blood can be detected. Hæmoglobin unites with oxygen, forming a bright-red color in solution; with carbon monoxide it gives a blue-red color. The color of hæmoglobin is due to hæmatin.

Hæmoptysis (-mop′ti-sis), spitting of blood from the lungs, a grave symptom in phthisis and some other diseases. Recurrence is frequent, and the quantity being large, a fatal result generally ensues. Syncope tends to retard this and other hæmorrhages, and ice, gallic and sulphuric acids, etc., are indicated for restraining it, and particularly of late the injection of ergotine.

Hæmorrhage, bleeding from the heart, arteries, capillaries, or veins, capillary hæmorrhage being the commonest form. Generally though not invariably the vessels are ruptured. In a solid organ it is called an extravasation, hæmorrhagic infraction (in embolism), or apoplexy. Hæmorrhage from the nose is known as epistaxis; from the lungs, hæmoptysis; from the stomach, hæmatemesis; from the female genitals, menorrhagia; from the urine, hæmaturia; from the bowels, melæna. The general indications for treatment are to stop the bleeding and prevent its recurrence.

Hæmothorax (-thō′rax), hæmorrhage into the pleura; the physical signs are those of pleuritic effusion, pleurisy, with the addition of blood in the inflammatory state, generally from rupture of some blood-vessel, as in aneurism, or of carcinoma of the lung giving way into the pleura.

Hæmus, in ancient geography, the name applied to that part of the Balkan chain which separates Thrace from Thessaly. According to mythology, Hæmus, son of Boreas and Orithyia, having aspired to divine honors, was changed into this mountain.

Haff, an extensive bay or gulf of Pomerania, Prussia, 10 miles N. of Stettin, at the mouth of the Oder, separated from the Baltic by a strip of land.

Haffner, Karl (häf′ner), an Austrian playwright; born in Königsberg, Nov. 8, 1804. He went on the stage at 16, and rose rapidly to eminence. He wrote about 100 dramatic pieces of various kinds, of which "Theresa Krones" merits notice. He died in Vienna, Feb. 29, 1876.

Hafiz (hâ-fiz′), the poetical name of KHWAJA SHAMS-AD-DIN MUHAMMAD, Persia's famous lyric-poet; born in Shiraz, about 1300. The most complete English edition of his works is that of H. Wilberforce Clarke: "The Dīvān ī Hāfiz, Translated" (1891). Hāfiz seems to be most characteristic in his many "Ghazels" or odes, whose themes are his own emotions. Sir William Jones was one of the first English translators. Other English translations include: "Selections from Hāfiz" (1875), by H. Bicknell; "Persian Poetry for English Readers" (privately printed, 1883), by S. Robinson; "Ghazels from the Divan of Hāfiz" (1893), by Justin Huntley McCarthy. There is a complete German translation by V. von Rosenzweig (3 vols. 1856-1864). He died in Shiraz in 1389.

Hag, the name of the fishes of the genus *Myxine,* which, with the allied lampreys, constitute the order of *Marsipobranchii.* They are of worm-like form and have no eyes or scales. The mouth is formed for suction, is without lips, and furnished with fleshy filaments or barbels. There is a single median fang on the palate by means of which the hag makes its way into the interior of other fishes, such as the cod, ling, or haddock, where it lives parasitically. The *M. glutinosa,* or common hag, takes its name from the quantity of viscid mucus which it can secrete. An American species is not uncommon in rivers of New York and New England.

Hagada (ha-gä′dä), in Hebrew literature, a branch of the Midrash, or most ancient Jewish exposition of the Old Testament; extends over the whole of these sacred books and is homiletic and poetical.

Hagedorn, Friedrich von (hä′ge-dorn), a German poet; born in Hamburg, April 23, 1708. He was successively in diplomacy, law, and trade, giving his leisure to literature. A volume of "Poetry, Fables, and Narratives," in 1738, after Lafontaine's style, was well received, and followed by "Odes and Songs," and versified tales of a moral tendency. He is noted for good taste and a pleasing style. He died in Hamburg, Oct. 28, 1754.

Hagemannite, in mineralogy, a variety of thomsenolite, constituting altered cryolite from Greenland. Hagemann describes it as dimetric pachnolite, it being found with that mineral. Dana called it thomsenolite, of which in the "British Museum Catalogue" it is recognized as a variety.

Hagen (hä′gen), an industrial town of Prussia, in the Ruhr coal district of Westphalia, 12 miles N. E. of Elberfeld-Barmen. It carries on a great deal of puddling and iron founding, and has manufactures of iron, steel, and tin goods, cotton, cloth, leather, paper, beer, and tobacco. Pop. (1905) 77,498.

Hagenau (hä′ge-nou), a town of Alsace-Lorraine; in the Hagenau forest, on the Moder, 21 miles N. by E. of Strassburg. It manufactures porcelain stoves and has cotton and woolen spinning. The chief trade is in hops and wine. The Romanesque church of St. George dates from the 12th century, and the Gothic church of Nicholas

from the 13th. Having been invested with town rights by Frederick Barbarossa in 1164, it was made a free imperial city in 1257. By the treaty of Westphalia (1648) it was given up to France, and in 1871 finally returned to Germany. Pop., commune (1900) 17,968.

Hagenbach, Karl Rudolf (hä'gen-bach), a German theologian; born in Basel, Switzerland, March 4, 1801. He studied theology at the Universities of Bonn and Berlin. From 1824 he occupied a chair of Theology at Basel; the subjects he taught were the history of dogma and of the Church. He wrote: "Church History" (2d edition 1885); "Manual of the History of Dogmas" (1840); "Encyclopædia and Methodology of the Theological Sciences" (11th edition 1884); "Sermons"; "Lessons in Religion for the Use of Higher Gymnasia" (6th edition 1881); "The Theological School of Basel" (1860); two small volumes of poetry; biographies; etc. He died in Basel, June 7, 1874.

Hagerstown, a city and county-seat of Washington co., Md., on Antietam creek, and on the Baltimore and Ohio, the Cumberland Valley, the Norfolk and Western, and the Western Maryland railroads; 22 miles N. W. of Frederick. It has extensive manufactures of knit goods, bicycles, machinery, steam engines, lumber, sashes, doors, blinds, etc. It is the trade center of Western Maryland and contains a court house, the male high school, Bacon's Home and Day School for Boys and Girls, electric lights and street railways, daily and weekly newspapers, 3 National banks, and an assessed property valuation of $7,000,000. Pop. (1900) 13,591; (1910) 16,507.

Haggai (hag'i), in the Old Testament, the 10th of the 12 minor prophets. Of the seer himself nothing is known. His book has always been regarded as canonical. The several dates are all in the second year of Darius the king—*i. e.*, of Darius Hystaspes, B. C. 520. The prophet aims at inducing the people without delay to resume the rebuilding of the temple which had been commenced in 535, the second year of Cyrus, but had been discontinued, owing to Samaritan and other opposition. Haggai predicted that the glory of the latter temple should be greater than that of its splendid predecessor, a prophecy which most expositors believe to refer to the first advent of Christ (ii: 7, 9). Verse 6 is quoted in Heb. xii: 26.

Haggard, Henry Rider, an English novelist; born in Norfolk, England, June 22, 1856. He was a barrister by profession. At the age of 19 he accompanied Sir H. Bulwer as secretary to Natal, and served on the staff of Theophilus Shepstone during his mission to the Transvaal. He wrote: "Cetewayo and His White Neighbors" (1882); "King Solomon's Mines" (1886); "She" (1887); "Beatrice"; "Doctor Therne" (1898); "History of the Transvaal" (1900); etc.

Haggis, a Scotch dish, usually made with the large stomach bag of a sheep, also one of the smaller bags called the king's hood, together with the lights, the liver, and the heart. After the stomach bags have been well cleansed, the small bag is boiled along with the pluck. A quarter of the liver is now grated down, and the heart, lights, and small bag are minced very fine together with a large onion and enough beef suet to moisten the meal. Two small teacupfuls of oatmeal previously crisped before the fire are added, with salt, and black and Jamaica pepper. The whole is now stirred together, and put in the large bag, which, however, must not be much more than half filled; it is sewed up, and afterward boiled for about three hours.

Hagiographa (-og'ra-fä), a Greek word, signifying sacred writings, first introduced by Epiphanius as the rendering of the Hebrew word *Kethubhim* = writings. The third and last great division of the Old Testament books, the others being Torah (the Law) and Nebiim (the Prophets). The division does not occur in the Old Testament itself. It is probable that the writings were originally called as they are in the prologue to Ecclesiastes, the "other writings." The three-fold division is alluded to in the New Testament, the several parts being described as "the law of Moses," "the Prophets," and "the Psalms" (Luke xxiii: 44). In this passage the Psalms are the Hagiographa. When the division is two-fold, the Law and the Prophets, the Hagiographa are merged in the second category (Matt. v: 17, xi: 13). In our present Hebrew Bibles the Hagiographa consist of 13 books thus arranged: Psalms, Proverbs, Job, Song of Solomon, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, and I and II Chronicles.

Hagiolatry (-ol'a-tri), Church history and Roman Catholic theology, the invocation of saints. In comparative religion, the highest form of manes worship, itself one of the great branches of the religion of mankind. Hagiolatry, in some form or other, exists in nearly every religion, and shows how deeply seated and widespread is the belief in the continuity of the human race. In the hagiolatry of the Roman Church, the student of the science of religion sees the agency which prompted the ancient Romans to deify Romulus, and which still leads the Chinese to sacrifice to the spirit of Confucius. The worship of saints answers strictly to the old manes worship, and they gradually replaced the

old local gods and the patron god of particular crafts. Thus St. Cecilia is the patron of musicians, St. Luke of painters, St. Peter of fishmongers, St. Sebastian of archers, St. Crispin of cobblers. In fact every trade or profession has its patron saint, while devotion to certain other saints is declared to be a preservative against certain bodily ills; thus St. Vitus protects his clients from the disease which bears his name; St. Hubert cures the bite of mad dogs, and so on.

Hague, The (hāg), the capital of the Netherlands, 2 miles from the North Sea and 15 N. N. W. of Rotterdam. It is one of the handsomest cities in the country, being intersected by canals and shady avenues of lime-trees, and having many fine public buildings and private houses. In the center of the city is the Vijver, or fish pond, to the S. of which stands the old castle of the counts of Holland. It consists of two courts, an outer and an inner; in this latter are the 13th-century Gothic knight's hall and the chambers in which the Dutch parliament holds its sittings. On one side of the outer court stands the gate tower, which was formerly used as a state prison, and in which the brothers De Witt were confined till dragged thence and torn to pieces by the populace (1672). The most noteworthy public buildings and institutions are the picture gallery, with a splendid collection of works by native painters (Paul Potter's "Bull" and Rembrandt's "Lesson in Anatomy"); the royal library, with 200,000 volumes, 4,000 MSS., and collections of coins and gems; the municipal museum, with several Dutch pictures; the Museum Meermanno-Westreenen, containing a collection of early printed books; the ethnographic museum, rich in Chinese and Japanese objects; the town-house; and the royal palaces. The church of St. James is the most important ecclesiastical edifice; it dates from the 14th century and is Gothic in style. The Hague is the seat of several learned societies, as the Indian Society and the Institute for the Language, Land, and People of the Dutch Indies. Among the numerous statues are those of William I. (two in number), William II., Spinoza, Bernhard of Saxe-Weimar, and the monument which commemorates the deliverance from the French. Close to the town is the beautiful pleasure park called "The Wood," in which stands a royal residence (1647) with the magnificent so-called "Orange Hall." Ryswick, where the treaty of 1697 was signed, is in the immediate vicinity. The Hague is connected by beautiful roads with Scheveningen, a fashionable bathing-place on the coast of the North Sea, which is incorporated municipally with The Hague. The city owes its importance mainly to the fact that it is the residence of the court and the capital of the country; but it has also considerable manufacturing industry, as iron founding, copper and lead smelting, cannon founding, printing, furniture and carriage making, and the manufacture of gold and silver lace. The Hague did not acquire importance till the 16th century: in 1527 it became the seat of the supreme court in Holland, in 1584 the place of assembly of the States of Holland and of the States-general; and it was also the residence of the stadtholders. Here many treaties have been signed and diplomatic conferences held, especially those of the Triple Alliance of 1668 and of 1717. In 1899 an international peace congress was held here, which established a permanent International Court of Arbitration. The second congress met in 1907. In 1903 Andrew Carnegie gave funds for the erection of a Temple of Peace, headquarters for the Court, and for an international law library for it. Pop. (1906) 242,054. See ARBITRATION; PEACE CONGRESS, UNIVERSAL.

Hague, Arnold, an American geologist; born in Boston, Mass., Dec. 3, 1840; was graduated at the Sheffield Scientific School of Yale College in 1863 and then studied abroad. Returning to the United States he spent about 10 years in the West investigating the Comstock lode. In 1877 the government of Guatemala appointed him geologist, and he visited the centers of volcanic activity and the chief mining districts of that country. In the following year he was employed by the Chinese government to study the gold, lead and silver mines in Northern China. In 1879, when the United States established the geological survey, he accepted a place in that bureau. His publications include "The Volcanoes of California, Oregon, and Washington Territories"; "The Volcanic Rocks of the Great Basin" (1884); "On the Development of Crystallization in the Igneous Rocks of Washoe" (1885); "Nevada, with Notes on the Geology of the District" (1885); etc.

Hague, William, an American clergyman and prose-writer; born in Pelham, N. Y., Jan. 4, 1808. He held pastorates in Baptist churches in Utica, N. Y., Boston, Providence, and New York; and was Professor of Homiletics in the Baptist Theological Seminary at Chicago in 1869. Besides his writings on religion, he published "Ralph Waldo Emerson," and "Life Notes, or Fifty Years' Outlook." He died in Boston, Mass., Aug. 1, 1887.

Ha-Ha Bay, an inlet of Saguenay river, in Chicoutimi co., Quebec, Canada, midway between Lake St. John and the St. Lawrence river; known also as Grande Bay. It is connected with Great and Little Ha-Ha Lakes by the Ha-Ha river; the bay is about 7 miles long, 1 mile wide, and 600 feet deep.

Hahn, Ludwig Philipp, a German dramatist; born in Trippstedt, Pfalz, March 22, 1746. His tragedies "Count Karl of Adelsberg" and "Robert von Hohenecken" are his ablest efforts. He belongs to the "storm and stress" period of German literature and displays its traits. He is sometimes confused with Johann Friedrich Hahn, an occasional poet, born about 1750, died in 1779. He died in Zweibrücken in 1814.

Hahnemann, Christian Friedrich Samuel (hä'ne-män), the founder of HOMŒOPATHY (*q. v.*); born in Meissen, Saxony, April 10, 1755. He entered the University of Leipsic at the age of 20; from Leipsic he proceeded to Vienna for clinical study; he then passed two years as physician and librarian to a nobleman residing in Transylvania; after which he entered and, in 1779, graduated at the University of Erlangen. During the following 10 years he practised medicine and held several public appointments in Dresden and elsewhere, and then settled in a small village near Leipsic. His observation and practice had convinced him, not only of the uselessness, but also of the injurious character of the prevailing methods of treatment, and he now abandoned all practice and devoted nimself to chemical research and the translation into German of foreign scientific books. In these investigations he occupied 6 years. They proved to him that, in all instances the medicine which had cured produced a very similar condition in healthy persons to that it had relieved. This conclusion he published in an essay in "Hufeland's Journal" in 1796. It is in this essay that the principle of *similia similibus curantur* (similar things are cured by similar things) is first put forward by him, not as a theory but as a fact. His views at once met with vehement opposition. The very small doses of medicine which alone were needed according to his method, provoked the apothecaries, who refused to dispense his prescriptions, and he accordingly gave his medicines to his patients without charge. For a physician to dispense his own medicine was an infringement of the privileges which German law had conferred on the apothecaries, and hence he was prosecuted in every town in which he attempted to settle from 1798 till 1810, when he returned to Leipsic. Two years afterward he was appointed a privat-docent of the university. At Leipsic he remained till 1821, when a successful prosecution by the apothecaries drove him from the city. Under the protection of the Duke of Anhalt-Köthen he retired to Köthen, where he became a center of attraction to numerous invalids in all parts of the world. He became known as one of the earliest advocates of hygiene. His book entitled "The Friend of Health" (1792) proves him to have been far in advance of his time in preventive medicine. Equally so was he in the treatment of the insane. He was also the author of several valuable papers on chemistry. His wife dying in 1831, in 1835 he married a French lady, who induced him to remove to Paris, where he resided and practised till his death, July 2, 1843. A statue of him was erected in Leipsic in 1851.

Hahn-Hahn, Countess Ida von (hän'-hän), a German novelist; born in Tressow, Mecklenburg-Schwerin, June 22, 1805. Domestic troubles involving a separation from her husband turned her mind to travel and literature. The scenes familiar to her were reproduced in her novels, which met with popular favor, particularly "Ulrich" and "Two Women." At the height of her career she became a convert to the Catholic faith. She then produced various books of a proselytizing nature, and in 1852 took the veil. She died in a convent founded by herself in Mainz, May 12, 1880.

Haidarabad, a State of Hindustan which comprehends the greater part of that central plateau of Southern India known as the Deccan, and is in possession of a Mohammedan prince, the Nizam; area, 80,000 square miles, exclusive of the Berar or Haidarabad Assigned Districts under British administration. The country is intersected or bounded by the Godavery, Kistnah, and their tributaries. The chief products are rice, wheat, maize, sugar cane, tobacco, cotton, indigo, fruits and timber. Pop. (1901) 11,141,142. The ruler of Haidarabad belongs to a dynasty founded by Asaf Jah, a distinguished soldier, whom the Emperor Aurungzeb made viceroy of the Deccan in 1713, with the title of Nizam or Regulator. HAIDARABAD, the capital, is on the Musi river at an elevation of 1,672 feet above the sea. It is surrounded by a stone wall flanked with bastions, forming an irregular quadrangle about 2¾ miles long on the river and 2 miles broad. Among the chief buildings are the extensive palace of the Nizam, the British residency, the Char Minar, or Four Minarets, built about 1590 as a Mohammedan college, but now used for warehouses; the Jama Masjid, or cathedral mosque, copied after that at Mecca. Pop. of city and suburbs (1901) 448,466.

Haifa (hī'fä), a seaport of Syria; at the foot of Mount Carmel. A little distance to the N. W. a settlement of the Würtemberg "Society of the Temple" was founded in 1869, who now form a flourishing agricultural colony, chiefly engaged in cultivating the vine and growing fruits. Grain is exported. Gordon Pasha paid visits to Haifa, and here Laurence Oliphant settled in 1882. A railway from Haifa and Acre (on the other side of the bay) to Damascus was begun in 1892.

Hail, the fall of aërial moisture in the form of ice. Hail occurs in two unlike forms, of different origin, which are now distinguished as hard, or true hail, and soft hail. The latter, often also known as sleet, denotes the fine, light rains that frequently fall in winter, rarely in summer, and seem an accompaniment of snow. Just how soft hail is formed is not yet known, and the mode of formation of hard hail is still a matter of theory, the easy explanation that it is frozen rain being insufficient. True hail occurs in hard, compact, irregular masses of ice, either clear or opaque, both kinds often occurring in alternate layers in a hail-stone. Hail-stones in the higher latitudes occur almost solely in the warmer months, and seem due to peculiar atmospheric conditions. They are most destructive when accompanying tornadoes or great thunderstorms, the hail-stones becoming occasionally larger than hens' eggs, and occasioning great devastation. Occasionally they are of great size and irregular shape, becoming ice masses of 2 or 3 inches diameter and several pounds weight, and falling with a force sufficient to kill animals.

The theory of hail formation entertained by many meteorologists is that atmospheric vapor, carried up by vertical motion of the air, is condensed into rain, and at a greater height into snow. The rain-drops, still carried upward, and held suspended for a time, are frozen into clear ice. They may fall in this condition, or may be caught during their fall by the vortex and again carried upward, gaining a new coating of ice, which is covered with frozen snow in the form of granular ice at a higher elevation. By a succession of such movements alternate layers of clear and granular ice are formed, the number of layers indicating the number of ascents and descents. These stones may be frozen together during their fall into the large, irregular masses often seen. Hail storms are limited in area and brief in duration. They are usually preceded by a sudden and considerable fall of the barometer, attended by wind, and followed by heavy rain.

Hail Mary, the best known and most general form of prayer which the Roman Catholic Church makes use of in honor of the Blessed Virgin. It consists of three parts: the salutation of the angel, "Hail, Mary! full of grace, the Lord is with thee" (Luke i: 28); and the words of Elizabeth, "Blessed art thou amongst women, blessed is the fruit of thy womb" (Luke i: 42), to which has been added the word Jesus; and the conclusion, "Holy Mary, Mother of God, pray for us sinners, now and at the hour of our death. Amen." Some theologians have held that the latter part was added by the Council of Ephesus (A. D. 431), that the petition as far as "sinners" dates from 1508, and that the remainder is of still later date and of Franciscan origin. The Hail Mary now finds a place in many ritualistic books of devotion.

Hailes, Lord, the judicial title of Sir David Dalrymple, a Scottish antiquary; born in Edinburgh, Scotland, Oct. 28, 1726. He was educated at Eton and Utrecht, whence he returned to Scotland in 1746, to be called to the Scottish bar two years later. He wrote "Memorials and Letters Relating to the History of Britain in the Reign of James I." (1762); "Annals of Scotland from the Accession of Malcolm III. to the Accession of Robert I." (1776); "Annals of Scotland from the Accession of Robert I. to the Accession of the House of Stuart" (1779). He died Nov. 29, 1792.

Hainan, an island of China, in the province of Kwang-tung, E. of the Gulf of Tonquin, separated from the mainland of China by a channel of but 10 miles in width; lat. 18° 10′ to 20° N., lon. 108° 25′ to 111° E.; area, 12,000 square miles. The E. coast is steep and rocky; the N. W. coast is unapproachable because of sand-banks; but the S. coast is indented with several commodious and safe harbors. The interior of the island is mountainous and barren, but the low lands near the sea are fertile and well cultivated. Products, sugar, pearls, coral, wax, gold, and silver. The metropolis of the whole island is Kiang-choo-foo, the port of which is open to European shipping from 1858. Though the Chinese have possessed this island since 108 B. C., yet there are in the interior some wild and hitherto unsubdued tribes.

Hainaut, a frontier province of Belgium, bounded E. by Namur, N. by Brabant, E. and W. by Flanders, and on the S. W. by France; area, 1,437 square miles. Products, wheat, flax; excellent breeds of horses, horned cattle, and sheep are also reared. Extensive coal fields, iron mines, marble, and limestone quarries. Pop. (1900) 1,142,954. Manufactures, linen, porcelain, and pens. Principal rivers Haine (whence the name), Sambre, Meuse, and Scheldt. Chief towns Mons (the capital), Tournay, Ath, Soignies, Charleroi, and Thuin. Hainault was governed by a regular succession of counts from the time of Regnier I., who began to reign about 860. In 1436 it passed into the hands of Philip the Good, Duke of Burgundy, and by the treaties of the Pyrenees, Nov. 7, 1659, and of Nimeguen, Sept. 17, 1678, part was ceded to France, forming the province of French Hainault. In 1814 it was allotted to the Low Countries, and in 1830 was incorporated with Belgium.

Hainburg (hīn′bŏrg), a walled town of Austria; on the Danube; 27 miles E. S. E.

of Vienna, with a royal tobacco factory. It is usually identified with the ancient Carnuntum; and a Roman aqueduct still supplies its market place with water. In the "Nibelungenlied" the castle of Hainburg is called Heimburc, the border fortress of the country of the Huns. It was taken from the Hungarians in 1042 by the Emperor Henry III., and afterward became a residence of the Austrian princes. In 1482 it was stormed by Matthew Corvinus, in 1683 by the Turks; and in 1827 it was burned to the ground.

Hainichen (hī'nich-en), a town of Saxony, the center of the German flannel manufacture; 13 miles N. E. of Chemnitz. Besides its staple product, it also manufactures cloth, leather, chenille, and plush. Here Gellert was born in 1715.

Hair, a small filament issuing from the skin of an animal, and from a bulbous root; or the collection or mass of filaments growing from the skin of an animal, and forming an integument or covering.

Anatomy and Physiology.— The structure is analogous to that of the teeth, the hair-follicle being an inversion of the skin, as the tooth-follicle is of the mucous membrane, and is formed like dentine by the conversion of pulp enclosed in a follicle, the external and densest part being the bulb, the soft interior the pulp. Hairs, like the nails, are horny protuberances from the epidermis, and show two parts, the cortical or investing (horny), and the medullary (the pithy interior), varying in different animals, from the hedgehog and porcupine to the musk-deer. Human hair is composed of a tube of horny fibrous substance, with a central medulla inclosing pigment cells; outside all are scales like tiles on a roof, forming delicate lines on the hair surfaces, transverse, oblique, or spiral. Emotion has been known to turn the hair white in a single night, but of all the animal tissues it is the most durable, being found very perfect in Egyptian mummies nearly 4,000 years old.

Botany.— Minute transparent filiform acute processes composed of cellular tissue more or less elongated, and arranged in a single row. They are formed by the epidermis, and may consist of a single cell, a cell-row, a cell-surface, or a cell-mass. They may, on the one hand, be simple or lymphatic; or, on the other, may be glandular. They are of various types; thus there may be stellate, scabrous, uncinated hairs, etc.

Commerce.— Curled hair for stuffing sofas, cushions, etc., is carded by hand-cards, which straighten, disentangle, and clean it; this is taken in bunches and spun into a rope, the next top, as the bunch is called, being interplaced with the loose strands of the former. The rope is wound on a wheel, and the coil steeped in water for three or four hours, and dried in a hot oven. The ropes are then untwisted, the hairs torn apart, and are ready to form stuffing. Curled-hair cords are also used for clothes-lines, and when fine for fishing-lines. Long and fine horse-hairs are used for the bows of violins and other instruments of this class; also for making HAIR-CLOTH (*q. v.*).

Firearms.— A spring or other contrivance in one form of rifle or pistol-lock, which is freed by the hair-trigger, and, striking with the tumbler-catch, releases the tumbler.

Haircloth, stuff or cloth made wholly or in part of hair, and used for the covering of chairs, couches, cushions, etc. In the form of a shirt it was formerly much used in penance. Horsehair for the manufacture of haircloth is principally derived from South America. It is first sorted according to color, and then hackled. A number of tufts are then placed between the teeth of two cards, and the longer hairs removed by hand, so as to leave only those of uniform length. Hair is curled by forming it into a rope, which is afterward boiled, and then baked so as to set the kink in the hairs. Haircloth is made from the longer and better varieties. The hair is first dyed, usually of a black color, and is merely employed as the weft of the cloth, the warp being composed of cotton or linen thread, according to quality and purpose. See HAIR MANUFACTURES.

Haircloth Loom. The warp of the web is of black linen yarn; the hair weft is thrown with a long hooked boxwood shuttle, or a long rod having a catch hook at its end. The weaver passes the shuttle through the shuttle-way when it is opened by the treadles; a child presents a hair to the catch of the shuttle, and the weaver draws it through the shed and beats it up by two motions of the batten. The hairs are laid in a trough of water to keep them supple. The warp is dressed with paste, and the haircloth is well hot-calendered to give it luster.

Hairdressing. As a matter of convenience, as well as of taste and fashion, the dressing of the hair has received much attention in all civilized nations, ancient and modern. Among savages the most extraordinary diversity as to the dressing of hair obtains; some frizzing it to the utmost extent; some fixing it in all sorts of perverse arrangements by means of frames, and some partially shaving the head. The Chinese pigtail, the American Indian scalp-lock, and the Moslem shaven head, with a small tuft left by which to be ultimately lifted into Paradise, are well known. According to Rev. J. G. Paton, missionary, some of the New Hebrides people have hair crisp

and woolly, stuck full of feathers and shells; others have hair long and wavy, twisted into as many as 700 separate whip-cords on a single head, requiring the labor of five years to complete. Among modern civilized Europeans the courtiers and cavaliers of the 17th century adopted the practice of wearing those "love-locks" which excited the ire of the Puritans.

It was, however, in the management of ladies' hair that the art of the professional hairdresser was in those times mainly exercised. In the 18th century, through the influence of French fashions, the dressing of hair, male and female, rose to a great pitch of extravagance and folly. (See WIG.) The hair of a lady of fashion was frizzed up in convolutions and curls, decorated with ribbons, jewels, and feathers, and filled with pomatum and powder to a degree perfectly monstrous. As women of less exalted rank slavishly attempted to follow these absurdities, the business of dressing hair was extensively followed. The cost of a full dressing being, however, too high to be lightly incurred, often one dressing was made to suffice for a week or fortnight, during which period such care was taken to preserve the greasy fabric undisturbed that it became the frequent resort of troublesome insects. From pressure of business it frequently happened that previous to balls ladies' hair had to be dressed one or two days in advance; and to keep the head-dress uninjured the lady sat in a chair perhaps two nights instead of going to bed. A tax on HAIR POWDER (*q. v.*), along with the simplification of fashions consequent on the French Revolution, not only expelled hair powder and perruques, but brought the profession of hairdresser within reasonable bounds. As regards ladies' hair, fashion is constantly altering. With respect to men's hair, short cutting is now universal. Pursued as an ordinary business in England and continental countries, hairdressing in the United States is to a large extent resigned to men of color, and in connection with many of the hotels they are provided with workrooms. Of the innumerable oils, essences, and pomades which are vended for the hair, on the doubtful assumption that they improve and nourish it, some are distinctly injurious.

Hair Dyes, substances used for changing the natural color of the hair to a more favorable one, and for hiding the approaches of age, as indicated by the presence of gray hairs. The means usually consist in washing the hair with a solution of some metallic salt known to have the effect of darkening its color, such as salts of silver, mercury, lead, and bismuth. Pyrogallic acid is also employed to give a brown tint, while a solution of peroxide of hydrogen in water imparts a fine golden color. The most perfect mode of dyeing the hair black is that of previously preparing it by a complete soaking with a solution of sulphide of potassium; the strength of this solution must depend on the depth of tint intended to be given; the stronger the solution the darker the color will be. When thoroughly wetted, the hair is allowed to dry partially; and while still damp it is to be saturated with a solution of nitrate of silver, of a strength proportionate to the depth of color desired. This makes a very permanent dye, which only requires renewing where the new growth of hair becomes conspicuous. The fashion of dyeing the hair is very ancient, and belongs as much to savage as to civilized nations; but in the case of the former vegetable dyes have been chiefly used. In China and other Eastern countries the juice of the petals of *Hibiscus Trionum*, the bladder-ketmia, and probably other species of hibiscus, is in general use.

The detection of stained hair is sometimes an object of medico-legal investigation. Lead may be detected by boiling the hair in dilute nitric acid, and then applying the tests for lead to the acid solution; while the presence of silver may be shown by digesting the hair in dilute hydrochloric acid or chlorine water, when the resulting chloride of silver may be dissolved out with a solution of ammonia and submitted to the ordinary tests for silver.

Hair Grass, a genus of grasses, having delicately panicled inflorescences, bearing spikelets with two unequal glumes, and two perfect flowers, each with two thin membranous bracts, of which the outer is generally awned. The species are natives of temperate and cold climates. Five species are natives of Great Britain, and are chiefly found in moors, sandy pastures, and other situations where the soil is unfertile. The tufted hair grass, or turfy hair grass (*A. cæspitosa*), common in better pastures and meadows, is a beautiful grass when in flower, but forms coarse tufts of very rough leaves, which are usually rejected by cattle. It attains a height of 2 to 4 feet, and is sometimes used for thatching ricks of hay or corn, and in some places for making mats. It grows luxuriantly in moist situations, and indicates a badly drained soil. It is occasionally tolerated, in order to add to the bulk of bog hay in moor grounds, but is carefully extirpated wherever agricultural improvement takes place. This grass is, however, sometimes sown to form cover for game, particularly hares; and in marshy situations for snipes and wild fowl.

Hair Manufactures, various articles made of hair.

Human Hair.— The trade in Great Britain in this is considerable, supplies of it

being chiefly obtained from continental Europe, India, and China. The hair shipped from Asiatic countries is coarse, that from Germany and Scandinavia is light colored, and that collected in Italy and Southern France is dark. Certain colors, such as pure golden, are of greater value than more common kinds, and hair from the living subject is much better than dead hair. Human hair is worked up into watch-guards, brooches, bracelets, and other personal ornaments, the patterns of which are often very beautiful.

Horse-hair.— The comparatively small quantity of this hair obtained in England is got from the combings of tails and manes, but it is of excellent quality. Horse-hair is imported from Russia, Germany, Belgium, South America, and Australia. The United States imports hair to the value of from $2,250,000 to $2,500,000 annually; exporting a value of from $350,000 to $420,000. Hair combed from the tails of horses is the most valuable, that from the mane being of inferior quality. "Live" hair commands the highest price. White is the most valuable kind as regards color, as it is suitable for dyeing bright tints, and the best hair is obtained from wild horses. Horse hair undergoes three sortings — viz., into sorts according to length, into different colors, and into various qualities. After this the hair is washed generally in warm soap baths and in water slightly heated, to which lime or potash has been added. The hair, except the white sort, which is to be bleached, is, after cleaning, passed through a dye bath in which logwood is the chief ingredient. Short hair being used for stuffing in upholstery work, and long hair chiefly for the manufacture of haircloth, the two kinds after the above treatment undergo different processes. Short horse-hair, though best for the purpose when used alone, is nevertheless mixed with cow and pig hair for stuffing chairs, sofas, etc. Different blends of these are made, and the three kinds thoroughly incorporated by suitable machines, after which the mixture is beaten and screened to clear it of dust. Then follows the "curling" process, by which the hair is first spun into ropes, which are next twisted into much shorter lengths, and by a third operation further twisted till they get into a convolute shape. The curl thus given requires to be fixed by placing the hair in cold water for several hours, and afterward in an oven, where it is kept for some time at a high temperature. This baking also destroys the eggs of obnoxious insects. The hair in this rope form requires to be teased up for use. For inferior stuffing vegetable fibers are now mixed with hair. See HAIRCLOTH.

Cow-hair.— Consumed in considerable quantities by plasterers to bind the plaster put on the internal walls of houses. As already stated, it is mixed with horse-hair for stuffing purposes, and with wool for common blankets, carpets, rugs, etc. Cow-hair is also used in the manufacture of roofing and other felts. This kind of hair is obtained in considerable quantities from tanneries.

Camel-hair.— This is obtained from the legs, the neck, and the humps of both species of camel. The hair of the Arabian camel is fine and light-colored; that from the Bactrian camel is coarser and of a darker shade. It, however, varies in degree of fineness according to the age of the animals, young ones yielding the finest kind. In Tartary, Persia, Arabia, and other Eastern countries camel-hair is woven into a soft, warm, and durable cloth for personal wear. It is also made into carpets, tent-coverings, and other articles. Since 1860 a good deal of this hair has been sent to Europe and America for weaving into carpets and for mixing with wool; in the case of the finer kinds, for warm clothing. The so-called camel-hair brushes are made from the tail of the sable or of some kinds of squirrel.

Goat-hair.— The hair of the common goat is used for the manufacture of cheap carpets and for other purposes, but that of the Angora or mohair goat is now a very important material in textile industries, being used in the manufacture of the fabric called mohair. The fine wool forming part of the fleece of the Cashmere or shawl goat is used in the manufacture of Cashmere shawls.

Pig-hair or Bristles.— Some pig-hair is mixed with other kinds for stuffing. The principal use of this material, however, is for making brushes. See BRISTLES: BRUSH.

Elephant's Hair.— The strong hair of the elephant's tail is occasionally turned to some use. For example, a native bracelet is employed by some of the tribes in Nyassaland, which consist simply of two such hairs plaited.

Hair Pencil, a fine brush for painting. The hairs of the camel, fitch, sable, badger, squirrel, marten, minever, European polecat, raccoon, goat, etc., are used for brushes of different qualities. A small tuft of the hairs is collected with the points all in one direction, and the bunch is bound with a strong thread, and passed point first through a wet quill, so that the point projects to the required distance. The quill shrinks tightly on the bunch in drying. The various sizes require the quills of the crow, pigeon, goose, turkey, or swan. Larger bunches are secured in tin. Principally used by artists in water colors, and

to some extent by house and sign painters in fine work.

Hair Powder, a pure white powder, made from pulverized starch, scented with violet or some other perfume, and at one time, especially in the 17th and 18th centuries, largely used for powdering over the heads of both men and women. To make the powder hold, the hair was usually greased with pomade. In Great Britain in 1795 a tax of a guinea (afterward £1 3s. 6d.) was put on the use of hair powder, and at one time yielded £20,000 per annum, but it had the effect of causing hair powder to fall into general disuse. The French Revolution, which overturned so many institutions, contributed also to the people of Europe returning to natural and unpowdered hair. The tax on hair powder was repealed in England in 1869.

Hair Shirt, in ecclesiology and Church history, an instrument of penance made of horse-hair; strictly speaking, it is a broad band rather than a shirt, and is worn round the loins, affording the wearer continual occasion of mortification. Ascetic writers strongly recommend it as a remedy for temptations against purity. Roman Catholic theologians see in Ps. xxxv: 13, the first instance of its use. Among the Carthusians it forms part of each monk's ordinary apparel.

Hair Spring, the recoil spring of a watch-balance; it is made of fine steel wound on reels like thread. To the naked eye it is a round hair, but under a glass it is seen to be a flat steel ribbon, about $\frac{1}{1250}$ of an inch in thickness, or about one-half the thickness of an average human hair. In a straight line it is a foot long; it weighs $\frac{1}{15000}$ of a pound Troy.

Hairs of Plants, outgrowths of epidermal cells, which assume various forms. They may remain unicellular, resembling simple tubes, or become multicellular by division of the originally simple cell. They develop on almost any part of the surface of plants; and there are few plants that are entirely without them. A plant may have only one form of hair; but most plants have several forms. Similar kinds of hairs are often characteristic of plants belonging to the same order, *e. g.*, the glandular hairs of the sun-dew (*Drosera*) order, the stinging hairs of the nettle (*Urtica*) order, and the scaly hairs of ferns. Root-hairs are among the simplest in form; they are always unicellular tubes which absorb water and certain minerals essential for the life of the plant. The aërial organs of plants develop hairs which serve to protect them from cold, or injury from other sources, *e. g.*, many winter buds have hairy scale leaves which often, with a gummy secretion, keep out moisture, and thus protect the tender tissues from injury by frost. Many leaves also are protected from excessive radiation by the growth of hairs. The common form of glandular hair is that with a swollen tip which secretes oily or resinous, often strongly-smelling, matters which may be regarded as waste-products that have become adapted to the attraction and capture of insects. Some glandular hairs have the glands within their bases. In the orders *Compositæ* and *Valerianeæ* hairs form on the fruit an organ of flight (*pappus*), by means of which the wind is enabled to carry the seeds, and thus secure their wide distribution. When hairs become stiff, generally by impregnation with silica, they form bristles; and when they become woody and hard they form prickles, as in the bramble and rose. Hairs may also grow internally in large intercellular spaces, but these occur only in a few plants.

Haiti, a republic on the island of Haiti, W. I.; bounded by the Dominican Republic, Atlantic Ocean, and Caribbean Sea; area, 10,204 square miles; capital, Port-au-Prince; pop. (1905) 1,425,000.

Topography.— The country is mountainous, being traversed by a volcanic range, which sends out lateral spurs, terminating in headlands on the coast. Cibao, the loftiest peak, reaches an altitude of 7,000 feet. The rivers are small and few in number and unnavigable. The lakes are quite numerous, and the salt lake of Henriquillo, near the S. shore, is remarkable for showing by its tides, subterranean connection with the Caribbean Sea.

Climate and Productions.— The climate is semi-tropical, but tempered by the sea breezes, and this, with its well-watered soil, makes Haiti the most fertile of the West Indies. The industries of Haiti are mainly agricultural, coffee being the principal product. Cocoa, cotton, and tobacco are grown, and considerable rum and other spirits distilled. The mineral resources are undeveloped, but are known to be of considerable importance. Copper, iron, nickel, gypsum, limestone, and porphyry are found in the N., but are but little worked.

Commerce.— In 1897 the imports aggregated in value $6,363,798, and exports $12,549,848. The exports consist principally of coffee, cocoa, logwood, cotton, hides, skins, mahogany, and honey. The import trade is carried on principally with the United States, Great Britain, France, and Germany.

Finance.— In 1899 the external debt of Haiti was $12,141,751; and the internal debt, $13,634,768. The revenue in 1898–1899, derived from custom duties on imports and exports, amounted to $7,963,465, and the expenditures, $7,958,352.

Government.— The government is that of a republic, the present constitution dating from June 14, 1867. The legislative authority rests in a National Assembly, divided into two chambers, the Senate and the House of Representatives. The House is elected by male vote for a term of three years, while the members of the Senate are elected by the House for a term of six years. The executive power is vested in the President, elected by the National Assembly, and sometimes by the troops, for a term of seven years. The administration is carried on under the president by the heads of four departments.

Religion and Education.— The authorized religion is nominally Roman Catholic. Instruction in elementary grades is free, and supported by the government to the extent of $1,000,000 annually. There were in 1900 400 national schools, besides private schools, and 5 public lycées.

History.— Haiti was a French colony previous to 1804 when it was proclaimed independent. The inhabitants are mostly negroes or mulattoes, speaking either French or a dialect known as Creole French. The history of Haiti has been marked by continual vicissitude; many insurrections have taken place, and attempts have been made to annex it to the United States. As a result of the revolution in 1908 the president, Nord Alexis, fled from Haiti, and on Dec. 20 of that year Antoine Simon succeeded him.

Hake, a genus of fishes of the cod family (*Gadidæ*), having a flattened head, an elongated body, two dorsal fins, of which the first is short, and the second very long, one very long anal fin, and the mouth destitute of barbels. One species, the common hake (*Merlucius vulgaris*), is found in the British seas, in those of the N. of Europe, and in the Mediterranean. It is sometimes 3 or 4 feet in length; and is of a whitish color, grayish on the back. It is a very voracious fish, devouring great numbers of herrings and pilchards; hence it is frequently called the herring hake. It is a coarse fish, its flesh white and flaky; but it is important as an article of human food and of commerce, being salted and dried in the same manner as cod and ling, in common with which it receives in this state the name of stock-fish. It is generally taken by lines, like cod and ling. In the spawning season, when it keeps near the bottom, it is sometimes caught by trawl-nets. One other species is known, *M. gayi*, which is common in the Strait of Magellan and on the coasts of Chile, and also occurs in New Zealand.

Hake, Thomas Gordon, an English poet and physician; born in Leeds in 1809. He took his medical degree at Glasgow University in 1831, and practised his profession in East Anglia, later becoming the physician and friend of Dante Gabriel Rossetti. His poetry is thoroughly original, but quaint, vague, and subtly philosophical. His works include: "Poetic Lucubrations" (1828); "Vates: A Prose Epic" (1839); "New Symbols," verse (1875); "Maiden Ecstasy," verse (1880); "A Divine Pastoral" (1883). He died in London, Jan. 11, 1895.

Hakim-Ben-Allah (hä-kēm-ben-äl-lä′), an Arabian impostor who flourished in the 8th century. He led a schism from Mohammedanism, but was overpowered and committed suicide. His story forms an episode in "Lalla Rookh."

Hakluyt, Richard (hak′löt), an English author; born about 1553; was educated at Oxford University. He was the author of "Four Voyages Touching the Discovery of America and Islands Adjacent to the Same" (1582); "Four Voyages to Florida" (1587); "The Principal Navigations, Voyages, and Discoveries Made by the English Nation"; etc. He died Oct. 23, 1616.

Hakodate (hä-kō-dä′tā), the chief port of Yezo, Japan, situated on a peninsula in the Strait of Tsugaru. The town is built partly on the inner slope of the Gibraltar-like hill (1,200 feet) which dominates the strait, partly on the low, sandy peninsula connecting the hill with the main island. The climate is severe. Hakodate, which has a magnificent harbor, is (since 1859) one of the open ports of Japan, and carries on a brisk export trade in seaweed, sulphur, bêche de mer, salted salmon, matches, etc. Pop. (1903) 85,313.

Hal (häl), a town in South Brabant, Belgium; 9 miles S. S. W. from Brussels. The church of St. Mary (1341-1409) is much resorted to by pilgrims on account of a black miracle-working wooden image of the Virgin, which during a bombardment in 1580 caught 33 cannon-balls in her lap— they lie piled up in the tower. Pop. (1900) 12,284.

Halacha (hä-lä′chä), one of two branches of exposition in the Midrash or most ancient Jewish exposition of the Old Testament, the other being the HAGADA (*q. v.*). The object of the Halacha was to ascertain the bearing of the Mosaic law on matters to which it did not directly allude.

Halberd, a weapon formerly much used by soldiers, consisting of a pole about 5 feet in length, surmounted by a head of steel, partly crescent-shaped. The poleax was its prototype. It took a great variety of fanciful forms, and was occasionally decorated with gilding, the blade being frequently perforated with ornamental devices. It ultimately became a mere decorative weapon, to be used for display in public

ceremonials, and as part of the paraphernalia of home troops, or palatial guardsmen.

Halberstadt (häl'ber-stät), a quaint old town of Prussian Saxony; in a fertile plain extending from the N. foot of the Harz Mountains, 25 miles S. W. of Magdeburg. The cathedral, containing fine painted glass, and valuable antiquities and objects of art, though restored in 1850–1871, is the most notable building in the town. It was erected in the 13th and 14th centuries in the Pointed style. Other buildings of interest are the church of Our Lady (1146), with antique reliefs and wall-paintings; the town house (1360–1381), before which stands a Roland pillar; the wine cellar beneath the town house; and the Peterhof, formerly the residence of the bishops. The chief industries of the town are gloves, cigars, machines, sugar, leather, paper, spirits, etc.; and there are also large workshops for railway repairs. Halberstadt dates from 820, the year in which the see was transplanted from Osterwieck to the site of the town of Halberstadt. It received town rights in 998; was twice burned down in the 12th century; and was held alternately by the Swedes and Imperialists during the Thirty Years' War. In 1684 it was given to Brandenburg. Pop. (1905) 45,534.

Halcyon, in ordinary language, the kingfisher. It was popularly supposed that these birds nested and laid their eggs in seaweed, etc., floating on the sea, and that they had the power of calming the sea. In zoölogy, a genus of *Alcedinidæ*, sometimes called *Halcyonidæ* (kingfishers), sub-family *Alcedininæ*. The bill is long, very straight, cylindrical, the sides widened, the base more or less depressed. *Halcyon leucocephalus* is found in India.

Halcyon Days, a name given by the ancients to the seven days which precede and the seven which follow the shortest day of the year, on account of a fable that during this time, while the halcyon bird or kingfisher was brooding, there always prevailed calms at sea. From this the phrase "halcyon days" has come to signify times of happiness and tranquillity.

Haldane, Robert, a Scottish philanthropist; born in London, England, Feb. 28, 1764; was educated at the grammar school of Dundee and the University of Edinburgh. In 1780 he joined the "Monarch," his uncle Viscount Duncan's ship, afterward saw some service under Admiral Jervis, and was present at the relief of Gibraltar, but left the navy at the peace of 1783 to settle on his estate near Stirling. The French Revolution fired him with new hopes for the regeneration of man, but ere long a profound spiritual change turned the energies of his life into completely new channels. His vast project for a great mission in Bengal, at his own expense, was frustrated by the East India Company's refusal of their sanction; but by his "Society for the Propagation of the Gospel at Home" he built so many "tabernacles" and supported so many itinerant preachers that in 12 years he had expended more than $350,000. In the year 1817 he lectured to theological students at Geneva and Montauban, and returned to Scotland in 1819, taking an active interest thereafter in all religious questions, as the Apocrypha and Sabbath controversies. He wrote: "Evidences and Authority of Divine Revelation" (1816); "On the Inspiration of Scripture" (1828); "Exposition of the Epistle to the Romans" (1835); etc. He died in Edinburgh, Scotland, Dec. 12, 1842.

Haldeman, Samuel Stehman, an American naturalist; born in Locust Grove, Pa., Aug. 12, 1812; was educated at Dickinson College; applied himself chiefly to the study of geology; was Professor of Natural Sciences at the University of Pennsylvania in 1851–1855; held the chair of Comparative Philology there in 1869–1880. He was the author of "Fresh-Water Univalve Mollusca of the United States" (1840); "Zoölogical Contributions" (1842–1843); "Elements of Latin Pronunciation" (1851); "Affixes in Their Origin and Application" (1865); "Pennsylvania Dutch" (1872); "Outlines of Etymology" (1877); etc. He died in Chickies, Pa., Sept. 10, 1880.

Hale, Benjamin, an American educator; born in 1797; was graduated at Bowdoin College in 1818; became a Protestant Episcopal clergyman; and wrote "Liberty and Law"; "Education in Its Relations to a Free Government"; etc. He died in 1863.

Hale, Charles Reuben, an American clergyman; born in Lewiston, Pa., March 14, 1837; was graduated at the University of Pennsylvania in 1858; held important posts in the Protestant Episcopal Church; and was made bishop in 1892. He died in Cairo, Ill., Dec. 25, 1900.

Hale, Edward Everett, an American author and Unitarian clergyman; born in Boston, Mass., April 3, 1822. He was educated at the Boston Latin School, and was graduated at Harvard College in 1839. He studied theology privately, was licensed to preach in 1842, and after supplying various congregations was chosen pastor of the Church of the Unity, Worcester, Mass., where he remained from 1846 to 1856. Called then to the South Congregational Church in Boston, he served as its pastor till 1901, when he became pastor emeritus. In 1902 he was made chaplain of the United States Senate. Radical rather than conservative in his tendencies, he was always an influen-

Hale

tial preacher, a leader in his denomination and in religious and philanthropic work of far-reaching significance. He was instrumental in organizing a number of humanitarian societies, such as the Harry Wadsworth clubs, King's Daughters, Look-up legions, and Lend-a-Hand clubs, as well as in promoting the Chautauqua circles and similar movements. He also ranks among the most voluminous of American writers, and as an author is best known by his short story, "The Man Without a Country," which originally appeared anonymously in the "Atlantic Monthly" in 1863, while another brief tale, "My Double, and How He Undid Me," also won wide popularity. A collected edition of his works, in ten volumes, containing but a small part of his writings, was published in 1901. The complete list of his published works includes some seventy titles. His "Ten Times One is Ten" (1870) perhaps exerted a greater influence than any other of his books, having led to the formation of numerous benevolent organizations. Among his other works are: "In His Name" (1873); "Philip Nolan's Friends" (1876); "Chautauquan History of the United States" (1887); "Life of George Washington Studied Anew" (1887); "The Story of Massachusetts" (1891). In his "James Russell Lowell and His Friends" (1889) and "A New England Boyhood" (1893) he perpetuated valuable reminiscences, and "Memoirs of a Hundred Years" (1902) may be regarded as a complement of those volumes. He edited the "Christian Examiner," founded and edited "Old and New" (1869-75), which was merged into "Scribner's Monthly," and edited various other periodicals. He also did important historical work by contributing to Winsor's coöperative histories and editing Lingard's "History of England," as well as in the "Franklin in France," with his son, E. E. Hale, Jr. (1887-88), "The Story of Christopher Columbus" (1891), etc. The books of travel written with his sister, Susan Hale, contain his best narrative and descriptive writing. He died June 10, 1909.

Hale, Horatio, an American ethnologist; born in Newport, N. H., May 3, 1817. Shortly after graduating at Harvard College, he was made philologist to the government exploring expedition under Captain Wilkes, and studied the languages of the Pacific Islands, North and South America, Australia, and Africa. The results of his observations were published in "Ethnography and Philology" (1846). From 1855 he practised law at Clinton, Canada. His other works are: "Indian Migrations as Evidenced by Language" (1883); "The Iroquois Book of Rites" (1883); "A Report on Blackfoot Tribes" (1885). He died in Clinton in 1896.

Hale, John Parker, an American statesman; born in Rochester, N. H., in 1806. He was United States attorney for his State in 1834-1841. Elected to Congress, in 1842, as a Democrat, his name was afterward removed from the party ticket because he refused to support the annexation of Texas. The struggle that followed ended in a victory for the Anti-slavery party, and in 1847 Hale was elected to the United States Senate, where he served for 16 years. He was the Free-soil candidate for the presidency in 1852, but received under 5 per cent. of the total popular vote. He was minister to Spain from 1865 to 1869, and died in Dover, N. H., Nov. 19, 1873.

Hale, Lucretia Peabody, an American author, sister of E. E. Hale; born in Boston, Mass., Sept. 2, 1820. She published among other works: "The Lord's Supper and Its Observance" (1866); "The Service of Sorrow" (1867); "The Wolf at the Door" in the "No Name Series" (1877); "The Peterkin Papers" (1882); "The Last of the Peterkins" (1886). She also wrote "The New Harry and Lucy" (with E. E. Hale). Her chief fame is as the creator of the Peterkins, who have become popularly recognized types of character. She died in Boston, Mass., June 12, 1900.

Hale, Sir Matthew, Lord Chief-Justice of England; born in Alderley, Gloucestershire, Nov. 1, 1609. In 1629 he entered the Society of Lincoln's Inn, and eight years later was called to the bar, which in a short time brought him considerable practice. He soon became prominent in public affairs, and during the quarrels between king and Parliament his attitude was non-partisan. After the death of Charles I. he threw in his lot with the Commonwealth, and was appointed a judge in the Court of Common Pleas in 1653, a position he held till the Restoration. In 1660 Charles II. made him Chief Baron of the Exchequer, and eleven years later he was promoted to the chief-justiceship, a dignity he had to relinquish on account of ill-health in February, 1676. After his death appeared his "History of the Pleas of the Crown," "History of the Common Law of England," and other of his writings. He died in Alderley, Dec. 25, 1676.

Hale, Nathan, an American patriot; born in Coventry, Conn., June 6, 1755. He rose to the rank of captain in the Continental army, and, having volunteered to penetrate the British lines and procure intelligence for Washington, was detected, and executed as a spy in New York city, Sept. 22, 1776. A statue was erected to his memory in New York in 1893.

Hale, Sarah Josepha (Buell), an American author and editor; born in Newport, N. H., Oct. 24, 1788. Left a widow in 1822 with five small children, she supported her family by literary work. From 1828 to 1837 she edited the Boston "Ladies' Maga-

zine," and when this periodical was consolidated with "Godey's Lady's Book," published in Philadelphia, she became editor. She retired from literary life in 1877, after writing several books in addition to her other labors. Her exertions in behalf of the Bunker Hill Monument fund, her interest in seamen, in foreign missions, and in the higher education of women, were untiring and effective. For more than 20 years she advocated the keeping of Thanksgiving Day as a national festival, to be held on the same day throughout the country, as it has been observed since 1864, when President Lincoln adopted her suggestion. Her most enduring publication is "Woman's Record: or Sketches of All Distinguished Women" (New York, 1874). She died in Philadelphia, Pa., April 30, 1879.

Hale, Susan, an American artist, sister of Edward E. Hale; born in Boston, Mass., Dec. 5, 1833. She wrote "Life and Letters of Thomas Gold Appleton" (1885). With her brother she wrote the "Family Flight" series of travels for young people. She died Sept. 17, 1910.

Halen, Gwyn. See NAUTWICH.

Hales, John, the "Ever-memorable," an English scholar; born in Bath, England, in 1584. At 13 he entered Corpus Christi College, Oxford, took his degree in July, 1603, and obtained a fellowship at Merton College in 1605. In 1612 he obtained the chair of Greek in Oxford University. In 1618 he went to The Hague as chaplain to the ambassador, Sir Dudley Carleton, for whom he made a report of the proceedings at the famous Synod of Dort, in a very interesting series of letters. Early in 1619 he returned to Eton to devote himself to study. Laud appointed him canon of Windsor in 1639, but the Puritan supremacy deprived him of his office and reduced him to want. His most noted work was "Golden Remains" (1659). He died in Eton, England, May 19, 1656.

Hales, Stephen, an English philosopher; born in Beckesbourn, Kent, England, Sept. 7, 1677. He entered Corpus Christi College, Cambridge, in 1696, was elected Fellow in 1702, and having taken holy orders was presented, about 1710, to the perpetual curacy of Teddington, in Middlesex. His first important publication was "Vegetable Staticks, or Experiments on the Sap of Vegetables" (1727), which may be regarded as the starting point of our true knowledge of vegetable physiology. In "Hæmastaticks" (1733), a second part of this work treating of the circulation of the blood, Hales gives results obtained by experimental methods of investigation like those now in use in studying physiology. Besides other independent works, including "The Means of Dissolving the Stone in the Bladder," he contributed numerous memoirs to the "Philosophical Transactions" on ventilation, electricity, the analysis of air, etc. His ventilating machines were introduced into the London prisons. His improvements in the mode of collecting gases did much to facilitate the subsequent labors of Black, Priestley, and Lavoisier. He also invented machines for distilling sea-water, preserving meat, etc. He died in Teddington, Middlesex, England, Jan. 4, 1761.

Halévy, Jacques François Fromental Elie (ä-lā-vē′), a French composer; born of Jewish family in Paris, France, May 27, 1799. He studied at the Conservatoire there under Berton and Cherubini, afterward at Rome, devoting himself especially to the old church music of Italy, and on his return strove in vain to put on the boards his operas, "The Bohemian" and "Pygmalion." His next operas, "The Artisan" (1827) and "The King and the Boatman" (1828) were failures, but "Clari" (1828), in which Malibran took the chief rôle, and the comic opera, "The Avignon Dilettante" (1829), were successes, and before long Halévy found himself the composer of the day, and his masterpiece, "The Jewess" (1835), carried his name over Europe. Later works represented with greater or less success are "Guido and Ginevra"; "The Thirteens"; "The Woolen Draper"; "The Queen of Cyprus"; "The Queen's Musketeers"; "Valley of Andorra"; "The Tempest"; "Lady of Pique"; the last two with the libretto by Scribe. Among his pupils were Gounod, Victor Massé, Bazin, and George Bizet, who married his daughter. Admitted to the Academy of Fine Arts in 1846, he became perpetual secretary in 1854. His life was written by his brother Léon (2d ed. 1863) and by Pougin (1865). He died in Nice, March 17, 1862.

Halevy, Joseph, an eminent French Orientalist and traveler; born in Adrianople, Turkey, Dec. 15, 1827. In 1868 he traveled in North Abyssinia; next he traversed (1869–1870) Yemen in quest of Sabæan inscriptions for the French Academy — one of the most fruitful journeys ever made by an archæologist. No European face had been seen in the Jowf since the soldiers of Ælius Gallus had visited it in the year 24 A. D., and Halevy traveled as far N. as Bled Nedjran (lat. 18° N.), and was able to collect as many as 860 inscriptions. His chief books are "Archæologic Mission to Yemen" (1872); "Journey to Nedjran" (1873); "Berber Studies" (1873); "Miscellanies: Semitic Epigraphy and Archæology" (1874); "Sabæan Studies" (1875); "Babylonian Civilization" (1877); "Miscellaneous: Criticism and History" (1883); etc.

Halevy, Leon, a French poet and author; brother of the foregoing; born in Paris, France, Jan. 14, 1802. He studied law, filled a chair in the Polytechnic School, and afterward, from 1837 to 1853, a post in the Ministry of Instruction, which he resigned to give himself entirely to literature. He wrote the introduction to Saint Simon's "Opinions Literary, Philosophical, and Industrial" (1825), and afterward, on his own account, histories, poetry, fables, novels, dramatic poems, and translations of "Macbeth"; "Clavigo"; etc. His best books are "History of the Jews" (1827–1828) and "Tragic Greece" (1845–1861). He died in St. Germain-en-Laye, Sept. 3, 1883.

Halévy, Ludovic, a French dramatist; son of Leon; born in Paris, France, Jan. 1, 1834. In 1861 he became secretary to the Corps Legislatif. He first made himself known as the writer of the librettos to Offenbach's burlesques (partly in collaboration with Meilhac); "Orpheus in Hades" (1861); "Beautiful Helen" (1865). "Parisian Life" (1866); "Grand Duchess of Gerolstein" (1867); and "The Brigands" (1870). He wrote besides a large number of vaudevilles and comedies, among them "Froufrou" (1869); "Tricoche and Cacolet" (1872); "The Debutante's Husband" (1878); and "The Little Mother" (1880). His "Madame and Monsieur Cardinal" (1873) and "The Little Cardinals" (1880) are delightfully humorous sketches of Parisian theatrical life; his "The Invasion" (1872) was a collection of personal recollections of the war. In 1882 he started the world with his charming idyllic story "Abbé Constantin," which has been well followed, but not in the same vein, by "Criquette" (1883) and "Deux Mariages" (1883) Halévy was admitted to the Academy in 1886. He died May 8, 1908.

LUDOVIC HALÉVY.

Halfblood, in law, relationship by being born of the same father, but not of the same mother (consanguinean relationship); or born of the same mother, but not of the same father (uterine relationship). In the succession to real or landed property in England, the halfblood relations by the father's side succeed after the fullblood relations; and next, the halfblood relations by the mother's side.

Halfbreed, in anthropology, the offspring of parents of different races, though the term is usually confined to the children of one of the white race and a Red Indian. Halfbreeds, specifically, two tribes, one at Red River Settlement, chiefly employed in agriculture, the other subsisting by hunting. The rise of independent halfbreed tribes is specially interesting, as it is "the first step toward the evolution of a distinct race." Whether more than the initiatory step will be taken seems problematical. Archdeacon Hunter, a Roman Catholic clergyman at Red River, states that though the offspring descended from mixed blood does not fail, it becomes very difficult to determine whether their descendants are whites or halfbreeds, so that their absorption is apparently only a question of time.

Half-caponiere, a communication in the dry ditch of a fortress, constructed with but one parapet.

Half-caste, one born of a European father or a Hindu or Mohammedan mother, or more rarely of a Hindu or Mohammedan father and a European mother; a Eurasian, an East Indian.

Half-crown, a silver English coin of the value of two shillings and sixpence (60 cents).

Haliaetus (-ā′e-tus), or **Haliæetus** (-ē′-e-tus), in ornithology, sea-eagle; a genus of *Falconidæ*, sub-family *Aquilinæ*. *H. albicilla* is the white-tailed or cinereous eagle of books. (See EAGLE.) *H. leucocephalus* is the sea-eagle, the bald-eagle, or the white-headed eagle, the species adopted as symbolical of the United States.

Haliastur, a genus of *Aquilinæ*. *H. indus* is the Pondicherry eagle, called by the English in India the Brahmany kite. It flies above rivers, pouncing on the fish, which are its chief food.

Haliburton, Thomas Chandler, a Canadian-American jurist and author; born in Windsor, Nova Scotia, in December, 1796. He was called to the bar in 1820 and became a member of the House of Assembly. He was raised to the bench as chief-justice of the Common Pleas in 1829, and in 1842 became judge of the Supreme Court. In 1856 he retired from the bench and took up his residence in England. In 1858 he received the degree of D. C. L. from the University of Oxford, and in 1859 entered Parliament as Conservative member for Launceston. He is best known as the author of "Sam Slick," the name of a Yankee clockmaker and pedlar, whose quaint drollery, unsophisticated wit, knowledge of human nature, and aptitude in the use of what he calls "soft sawder" have given him a fair chance of

immortality. The series of newspaper sketches in which this character had first been introduced was published in 1837 as "The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville"; two later series followed in 1838 and 1840, and "The Attaché, or Sam Slick in England"; in 1843. Haliburton's other works include "A Historical and Statistical Account of Nova Scotia"; "Bubbles of Canada"; "The Old Judge, or Life in a Colony"; "Letter-bag of the Great Western"; "Yankee Stories, and Traits of American Humor"; "Nature and Human Nature"; "Rule and Misrule of the English in America"; and "Wise Saws and Modern Instances." He died in Isleworth, near London, England, Aug. 27, 1865.

THOMAS C. HALIBURTON.

Halicarnassus (-nas'sus) (originally called Zephyria), a Greek city of Caria, Asia Minor, on the Ceramic Gulf. It was founded by Dorian colonists from Trœzen, and defended by several citadels, one of which, Salmacis, was deemed impregnable. Early in its history it became one of the cities of the so-called Dorian Hexapolis, from which confederacy, however, it was eventually excluded. When the Persian power spread W. Halicarnassus readily submitted to the dominion of the conquerors. During this period, however, about 500 B. C., a domestic tyrant, Lygdamis, rose to supreme power as a vassal of Persia; and his descendants, without forfeiting the Greek character or ceasing to cultivate the Greek literature and arts, gradually extended their sway over all Caria. Among them was Mausolus, whose wife and sister Artemisia, to commemorate him after his death (353), erected the magnificent MAUSOLEUM (*q. v*). which was accounted one of the seven wonders of the world. It was under this king that the city attained its highest degree of splendor and prosperity. About 20 years later Alexander the Great destroyed the city by fire; but the inhabitants took refuge in the citadel, which successfully resisted his arms. The city was afterward rebuilt, but it never recovered its ancient importance or prosperity. Halicarnassus was the birthplace of the Greek historians Herodotus and Dionysius. The site of the city is occupied by the modern Budrun.

Halidon Hill, an eminence about a mile to the N. W. of Berwick, the scene of a disastrous defeat of the Scots by the English, July 19, 1333. Edward III. of England had laid siege to Berwick, the governor of which promised to surrender July 20, if not previously relieved. On July 19, Archibald Douglas, regent of Scotland, led a Scotch army to the relief of the town, and attacked the English at Halidon Hill, but was totally routed with the loss of 10,000 men.

Halifax, a municipal and parliamentary borough of England, in York county (West Riding), on the Hebble, 36 miles W. S. W. York. It is built on a rising slope, and has a very picturesque appearance. The more modern streets are spacious and well paved. Among the principal buildings are parish church of St. John the Baptist (restored 1879), All Souls' Church, the Square Church, theater, infirmary, etc. There are several charitable institutions, three public parks, and two grammar schools. Halifax commands abundant supplies of coal and water, and an extensive inland navigation connecting it with Hull and Liverpool. It is one of the centers of the woolen and worsted manufactures in Yorkshire. Pop. (1901) 104,997.

Halifax, a city of Nova Scotia, Canada, capital of the province and of Halifax co. It is situated on the E. slope of a small peninsula in Halifax harbor—called by the Indians Chebucto, "chief of havens"—one of the finest and safest harbors in the world, 16 miles long, 1 to 2 miles wide, and 8 to 12 fathoms deep. Including Bedford basin, the harbor covers an area of about 20 square miles. Along the W. shore of the city extends the beautiful Northwest Arm, about 3½ miles long and ½ mile wide. Forts and batteries protect the harbor, and near the center of the peninsula stands the Citadel, once the strongest fortress in British America, now used as the barracks of the garrison. Halifax is the winter mail port for steamships running between Canada and Great Britain. In summer about 20 lines use the port on regular schedules, and several more in winter. There are direct lines to France and South Africa, to the West Indies, to Mexico, and to all the chief cities of the Atlantic coast. The city is entered by the Intercolonial, Halifax and Southwestern, Dominion Atlantic, and Canadian Pacific railways, and as the Atlantic terminus of great lines it must grow steadily in importance. The street railway service has an excellent equipment..

Streets, Parks, and Buildings.—The older part of the city stretches about 3 miles along the harbor, and the principal streets, running parallel to the shore, rise one above another up to the Citadel, which crowns an eminence about 250 feet in height, command-

Halifax

ing a perfect view of the city and of the harbor and its approaches, guarded by St. George's and Macnab's islands and the formidable bluff at York Redoubt. The main business streets are Water, Hollis, Granville, and Barrington. The chief residential streets are Pleasant, Inglis, South Park, Morris, Spring Garden road, Young avenue, Tower road, and South street, in the S. and W. parts of the city, and Brunswick and Gottingen in the N. There are considerably more than 100 miles of streets, and the city pays liberally for paving, sewerage, etc. Point Pleasant park, on the point of land that divides the harbor proper from the Northwest Arm, comprises about 260 acres, is beautifully wooded and well kept, and has magnificent driveways. Both banks of the Arm are lined with summer residences. More than 1,000 boats and canoes are housed on the shores, and regattas are held here every year. In the park an ancient martello tower and several powerful modern forts are located at strategic points commanding the harbor entrance. Young avenue, leading to the main entrance of the park, is a broad street and speedway, bordered on both sides by handsome residences. At the entrance are the beautiful gates presented by the late Sir William Young, one of the city's benefactors. The Public Gardens, situated on a square bounded by Summer, Sackville, and South Park streets and Spring Garden road, are 18 acres in extent, and are said to be unsurpassed in E. Canada. They are maintained by a civic grant. Among their objects of interest are the South African and Victorian memorial fountains and many other fine works of sculpture. North of the Public Gardens is the athletic field of the Wanderers, beyond which is the Common. Among the noteworthy buildings are Government House, in the S. end of the city, and the Province building, near the center, a good example of Ionic architecture, containing the legislative chambers and government offices, and adorned with valuable paintings by Reynolds and others. In the square to the S. stands a noble statue of Joseph Howe, Nova Scotia's most distinguished public man. Other buildings worthy of mention are the post office, custom house, Wellington barracks, court house, and St. Mary's Cathedral. The Dockyard has many features of interest to visitors. The greater part of the business portion of the city is now substantially built of brick and stone.

Hotels, Clubs, etc.—Among the more prominent hotels are the Halifax, Queen, King Edward, Albion, Carleton, Elmwood, and Hillside. The Waverley and the Birchdale, on the Arm, accommodate many transient guests. Leading clubs include the Halifax, City, Canadian, Studley Quoit, Halifax Curling, Wanderers' Athletic, and others. The Royal Nova Scotia Yacht Squadron, the Northwest Arm Rowing Club, the Halifax Amateur Boating Club, and the Lorne and St. Mary's clubs have made the city an attractive center for yachting, boating, and rowing. The principal theater is the Academy of Music.

Churches, Charities, and Education.—Halifax has 39 churches, several of which are historically interesting. St. Paul's is the oldest Protestant church in Canada. The city is the residence of a Roman Catholic archbishop and of an Anglican bishop. The public school system embraces (1907) 30 schools, under control of a board one-half of whose members are appointed by the provincial government, the other half by the city council. Halifax is noted for the number and excellence of its charitable and educational institutions with their substantial buildings. Among the former are the School for the Blind, Institution for the Deaf and Dumb, Protestant and Catholic Infants' homes, Home for Fallen Women, Provincial General Hospital, Hospital for the Insane, Old Men's Home, Old Ladies' Home, and others. The educational institutions include Dalhousie College and University, the Presbyterian Theological College, Provincial College of Technology, Halifax Ladies' College, Maritime Business College, Halifax Medical College, Mt. St. Vincent Catholic Girls' School (one of the finest in Canada), and Protestant and Catholic orphanages. Several of the above-mentioned institutions serve for more than one province. Among the various libraries is the Citizens' Free Library, in the city hall. The leading newspapers are the "Morning Chronicle," "Halifax Herald," "Daily Echo," "Acadian Recorder," "Evening Mail," "Nova Scotian," "Maritime Merchant," and "Halifax Royal Gazette," the oldest Canadian newspaper, established in 1752.

Commerce and Industries.—In recent years the arrivals and departures of vessels, foreign and coastwise, have averaged over 10,000, with an aggregate tonnage of about 3,000,000. Halifax is the center of the dried fish trade of the province and sends large exports of fish to the West Indies and to South American and Mediterranean ports. Other exports are lobsters, lumber, apples, flour, agricultural and dairy products, and coal. In 1905 the exports were valued at $8,500,000. The imports reached $8,200,000, and included manufactures from Great Britain, products from the United States, sugar, molasses, and fruit from the West Indies. The principal industries are iron founding, brewing, distilling, sugar refining, fish packing, ship and boat building, manufacture of cotton and woolen goods, machinery, cars, paints, gunpowder, shoes, clothing, confectionery, spices, soap, candles, tobacco, brushes, paper, and musical instruments. In 1906 the value of the city's industrial output was $8,145,000. Halifax has an

efficient board of trade and 6 chartered banks.

Government and Finance.—The city administration is conducted by a mayor and a corporation of 18 aldermen. The charter requires the sanction of the provincial legislature for all loans, and prevents the expenditure by any department of a greater amount than is placed to its credit in the estimates. The management of civic works is in the hands of the board of works, consisting of the mayor and two aldermen chosen by the council; the administration of the other branches of the city service is managed by committees appointed by the council, but large powers are placed in the hands of the city engineer. The assessable property in 1905-06 was valued at $27,030,000, of which over $18,000,000 was real estate. The net debt was $2,223,313. The sinking and reserve funds reached $250,000. The total assets were estimated at $2,936,000. The city owns and manages its water works. Halifax sends 3 representatives to the provincial legislature and 2 to the Dominion House of Commons.

History and Population.—Halifax was founded in 1749. The Treaty of Aix-la-Chapelle (1748) had restored Cape Breton to the French against the will of the people of New England, who had just captured it, and confirmed the cession of Nova Scotia to the British crown. Disputes arose as to the new boundaries of French and British America; the French governor of New France, or Canada, induced large numbers of Acadian French to migrate to or near to the disputed territory; and forts were erected by both nations thereon. Then, at the urgent request of the New England colonies, the British government offered free grants of land and other inducements to colonists from among the military who would settle in Nova Scotia. In consequence of this some 4,000 disbanded soldiers arrived in Chebucto harbor, June 21, 1749, and began the foundation of a town, which they named in honor of the Earl of Halifax, then president of the English board of trade. In 1750 it became the capital of Acadia (Nova Scotia). It has been a naval center for Great Britain ever since. Halifax was declared a free port in 1817, and in 1842 was incorporated as a city. The British used it as a base of supply during the Revolutionary War, and during the American Civil War it was a convenient port for blockade runners. From 1825, when the first bank was opened, the commercial importance of Halifax may be dated. The city early established steamship communication with Europe, and the arrival of the "Britannia" in July, 1840, marked the inauguration of the Cunard line. Railway enterprise began about the same time. Dartmouth, on the other side of the harbor, with a population of 4,806 in 1901, is practically a suburb of Halifax. Pop. (1790) 4,000; (1828) 14,439; (1881) 36,100; (1891) 38,556; (1901) 40,832; local est. (1907), 45,500.

Halifax, Charles Montagu, Earl of, an English poet and statesman; born in Horton, Northamptonshire, April 16, 1661. He was educated at Westminster School and Trinity College, Cambridge, where he formed a lifelong friendship with Newton. In 1688 he became member for Maldon in the Convention Parliament. In 1692 he was made a commissioner of the treasury, and he induced Parliament to raise a loan of £1,000,000—the beginning of the national debt. In 1694 he procured the establishment of a national bank (see BANK—*Bank of England*), adopting the scheme of William Paterson (*q. v.*). In 1694 he was appointed chancellor of the exchequer. His next work was the recoinage in 1695, which he carried out successfully, and at this time he first introduced exchequer bills. He became premier in 1697, but two years later accepted the auditorship of the exchequer and withdrew from the Commons as Baron Halifax. He was impeached in 1701, and again in 1703, but not convicted. During the whole of Anne's reign Halifax remained out of office, but was active in promoting the union with Scotland and the Hanoverian succession. On the queen's death he was appointed a member of the council of regency, and on George I.'s arrival became an earl and prime minister, his rule lasting only nine months. Halifax was joint author with Prior of "The Town and Country Mouse" (1687), a parody on Dryden's "Hind and Panther." He died May 19, 1715.

Haliotidæ (-ot'i-dē), ear-shells. A family of gasteropodous mollusks, order *Prosobranchiata,* section *Holostomata.* Shell spiral, ear-shaped, or trochiform; aperture large, nacreous, outer lip notched or perforated, no operculum. Animal with a short muzzle and two branchial plumes.

Hall, the large principal apartment of the castles and mansions of the Middle Ages. In it the king or the lord of the manor gave audience, administered justice, received and entertained his retainers and guests, and performed all the public acts of feudal life. At one end was a raised platform or dais, on which the table of the lord of the manor was placed, and where his more honored guests sat along with him. This end of the hall was usually lighted with large oriel windows, and communicated with a building which contained the lord's solar, or bedroom and parlor, on the upper floor, and the wine cellar below. The retainers sat at a table which ran along the lower part of the hall. Survivals of such mediæval dining halls may be found in the Oxford and Cambridge colleges, with their high tables, portraits, stained glass, etc., as also in the halls of the Inns of Court and

of some of the London guilds. The roofs were very carefully and elegantly constructed, as many still remaining show. The hall was essentially a part of feudal architecture. When that system gave way, the large common halls were abandoned and private dining-rooms substituted. Many old ones, however, still remain; but their use is changed. The hall of the king's palace, now called "Westminster Hall," built by William Rufus and restored by Richard II., is the finest example in England, being 300 feet long and 100 feet broad.

Hall, Anna Maria Fielding, a British novelist; born in Dublin, Ireland, Jan. 6, 1800. In her fifteenth year she went to London, where she married S. C. Hall. She published "Sketches of Irish Character" (1828); "The Buccaneer" (1832); "Tales of Woman's Trials" (1834); "The Outlaw" (1835); "The French Refugee," a drama; "Uncle Horace" (1837); "Lights and Shadows of Irish Character" (1838); "Marian" (1839); "Midsummer Eve" (1843); "The Whiteboy" (1845); etc. Her "Stories of the Irish Peasantry" appeared originally in "Chambers's Journal." She was also active in various philanthropies. She died Jan. 30, 1881. See Hall, Samuel Carter.

Hall, Asaph, an American astronomer; born in Goshen, Conn., Oct. 15, 1829. He was appointed in 1862 assistant in the United States Naval Observatory at Washington, and the next year a professor of mathematics in the navy. In 1874 and 1882 he had charge of one of the parties sent to observe the transit of Venus. In 1877, with the 26-inch equatorial of the Naval Observatory, he made his discovery of the two remarkable satellites of Mars (*q.v.*), which he called Deimos and Phobos, and whose orbits he calculated. Our knowledge of the difficult satellite systems of Mars, Saturn, Uranus, and Neptune depends almost entirely on his work. He died in Annapolis, Md., Nov. 22, 1907.

Hall, Basil, a British author; born in Edinburgh, Scotland, Dec. 31, 1788; was the son of Sir James Hall of Dunglass, the founder of experimental geology, also distinguished as a chemist and as author of a work on Gothic architecture. Basil entered the navy in 1802, and became post-captain in 1817. When Lord Amherst was sent on a mission to the court of Peking in 1816, Hall commanded a sloop in the naval escort, and visited the W. coast of Korea. The chief results of his explorations were published in "A Voyage of Discovery to Corea and the Great Loo-Choo Island" (1818). After this he wrote "Extracts from a Journal Written on the Coasts of Chili, Peru, and Mexico"; "Travels in North America"; "Fragments of Voyages and Travels" (1831-40); "Schloss Hainfeld" (1836), a semi-romance; and "Patchwork" (1841), a collection of tales and sketches. He was also the author of various articles in the scientific journals of the day. He died in Gosport, England, Sept. 11, 1844.

Hall, Baynard Rust, an American author; born in Philadelphia, Pa., in 1798; was graduated at Union College in 1820 and at Princeton Theological Seminary in 1823; was ordained in the Congregational Church; spent his life in preaching and teaching. He was the author of a very popular book, "The New Purchase, or Life in the Far West" (1843). His other works include a Latin grammar "Something for Everybody" (1843); "Teaching a Science; The Teacher an Artist." He died in Brooklyn, N. Y., Jan. 23, 1863.

Hall, Charles Cuthbert, an American educator; born in New York, Sept. 3, 1852; was graduated at Williams College in 1872, and studied theology at the Union Theological Seminary and in London and Edinburgh; and was pastor of the Union Presbyterian Church, Newburg, N. Y. (1875-77), and the First Presbyterian Church, Brooklyn, N. Y. (1887-97). In 1897 he became president of the Union Theological Seminary, New York city. His publications include "Christian Belief Interpreted by Christian Experience" (1905) and "Redeemed Life After Death" (1905). He died in New York city, March 25, 1908.

Hall, Charles Francis, an American Arctic explorer; born in Rochester, N. H., in 1821. He was successively a blacksmith, journalist, stationer, and engraver, and, becoming interested in the fate of the Franklin expedition, devoted his leisure to gathering information about Arctic America. He made two search expeditions, in 1860-62 and in 1864-69, living alone among the Eskimo, and bringing back some relics and the bones of one of Franklin's company; and in 1871 he sailed in command of the government ship "Polaris," on an "expedition to the North Pole." He took his vessel for 250 miles up the channel leading from Smith's Sound, and on Aug. 29 reached 82° 16′ N.—at that date the highest N. latitude ever reached; then turning S., he went into winter quarters at Thank God Harbor, Greenland (81° 38′ N.). Here on his return from a sledge expedition to the N., he was taken suddenly ill, and died Nov. 8, 1871; over his grave a grateful epitaph was placed by the British polar expedition in 1876. His companions left Thank God Harbor in August, 1872. In October, through the ice-anchor slipping, nineteen men were left with stores on a floe, and only after severe sufferings were they rescued by a sealer off the Labrador coast in the following April. The leaking "Polaris" was beached on Littleton's Island, and in June, 1873, the party set out for Upernavik in two boats which

they had constructed; they were ultimately picked up by a Dundee whaler near Cape York. Among the valuable results of Hall's work were the exploration of the West Greenland channel, and the extension of Greenland and Grinnell Land 1½° N. Hall published "Arctic Researches, and Life among the Esquimaux" (1864); and from his papers largely was compiled the "Narrative of the Second Arctic Expedition" (1879).

Hall, Christopher Newman, an English Congregational preacher; born in Maidstone, England, May 22, 1816; was educated at Highbury College, and received the degree of LL. D. in 1835. He was ordained in 1842, his first charge being at Hull. In 1854 he was made pastor of Surrey Chapel, known as Rowland Hill's Chapel, in Blackfriar's Road, London, from which place he moved with his congregation into the fine edifice of Christ's Church, which was erected mainly through his exertions. During the Civil War he favored the Union side, and in 1865 visited the United States. This visit was followed by another in 1873, when he delivered lectures in the principal cities. His third visit, which was brief, was made in 1884. He was the author of "The Christian Philosopher"; "Land of the Forum and the Vatican"; "Lectures in America"; etc. He died in London Feb. 18, 1902.

Hall, Fitzedward, an American philologist; born in Troy, N. Y., March 21, 1825. He was graduated from Harvard College in 1846; spent many years in India and made a thorough study of its tongues, contributing to local journals original translations in prose and verse. He received the D. C. L. from Oxford in 1860. Settling in London in 1862, he accepted the chair of Sanskrit and Indian jurisprudence in King's College. He was the first American to edit a Sanskrit text. Professor Hall discovered the supposed lost works: "Bhârata's Nâtyasâstra," "Harshaacharita," and a complete copy of the valuable "Brihaddevatâ." His contributions to our knowledge of Hindu and allied literatures are of inestimable value, and his text books in this field are valuable and authoritative. He was one of the chief collaborators in Dr. Murray's "Etymological Dictionary." He died in 1901.

Hall, Granville Stanley, an American educator; born in Ashfield, Mass., May 6, 1845; was graduated at Williams College in 1867; was Professor of Psychology at Antioch College, O., in 1872--1876; accepted the similar chair at Johns Hopkins University in 1881; and was chosen president of Clark University (*q. v.*) in 1888. His publications include "Aspects of German Culture"; and "Hints Toward a Select and Descriptive Bibliography of Education" (with John M. Mansfield); also established and became editor of the "American Journal of Psychology" and "The Pedagogical Seminary," etc.

Hall, James, an American jurist and author; born in Philadelphia, Pa., Aug. 19, 1793. He served during the war of 1812–1814, and in 1818 returned to the study of the law at Pittsburg, Pa. In 1812 he was elected judge of the Circuit Court of Illinois, and also State treasurer. In 1833 he took up his residence in Cincinnati, where he devoted himself to the mixed pursuits of banking and literature. His chief works are, "Legends of the West" (2d ed. 1833); the "Harpe's Head, a Legend of Kentucky" (1833); "Sketches of the West" (1835); "Tales of the Border" (1835); and "Notes on the Western States" (1838). In conjunction with T. H. McKenney, he brought out an elaborate and costly "History of the Indian Tribes" (3 vols. 1838–1844), for which he supplied the greater part of the letter-press. Of his later works the chief are the "Wilderness and the War-Path" (1845), and the "Romance of Western History" (1859). A uniform edition of his works was published in 1853. He died near Cincinnati, O., July 5, 1868.

Hall, James, an American geologist and palæontologist; born in Hingham, Mass., Sept. 12, 1811. After studying at the Rensalaer Polytechnic School for six years; he was, in 1837, appointed on the New York Survey, and his report was published in a quarto volume, with illustrations from his own pencil. He published also "Palæontology of New York" (3 vols. 1847, 1852, and 1859), and was, in 1855, appointed Geologist of the State of Iowa, of the survey of which he published a volume in 1858, the New York Legislature having made final arrangements with him to continue his "Palæontology." In 1850 he was elected by the Royal Geographical Society of London one of its 50 foreign members, and in 1858 he received the Wollaston Medal from the same scientific body. He was a member of several scientific societies in Europe and in the United States. He died near Bethlehem, N. H., Aug. 7, 1898.

Hall, John, an Irish-American Presbyterian clergyman; born near Armagh, Ireland, July 31, 1829. He was educated at Belfast College. In Ireland he held important pastorates, and was one of the Commissioners of Education, a crown appointment. In 1867 he became pastor of the Fifth Avenue Church, New York. For years he was Chancellor of the University of the City of New York; he was also trustee of Princeton University; of the Union Theological Seminary, and of Wellesley College; president of the Presbyterian Board of Home Missions, and chairman of the Church Extension Committee, at the same time giv-

ing much attention to the work of the Evangelical Alliance, the City Mission, etc. He wrote "Family Prayers for Four Weeks" (1868); "Papers for Home Reading" (1871); "Questions of the Day" (1873); "God's Word through Preaching" (1875); "Foundation-Stones for Young Builders" (1879); etc. He died in Bangor, County Down, Ireland, Sept. 17, 1898.

Hall, Lyman, one of the signers of the Declaration of Independence; born in Connecticut about 1731. He was graduated at Yale College in 1747, commenced the study of medicine at Sunbury, Ga., in 1752, represented the latter State in Congress 1775–1780, was appointed governor of his State in 1783, and died in 1791.

Hall, Marshall, an English physician and physiologist, the son of Robert Hall, who introduced the practice of bleaching cotton with chlorine; born in Basford, in Nottinghamshire, England, Feb. 18, 1790. After studying medicine at Edinburgh (1809–1814), Paris, Göttingen, and Berlin, he settled at Nottingham in 1817 and practised in London from 1826 till 1853. Hall claimed in 1833–1837 to have been the first to show the independence of the phenomena of the reflex action of the spinal system of sensation, to work out the laws of their causation, and to apply the knowledge of them to the comprehension of nervous diseases. His name is also associated with a well-known method of restoring suspended respiration (see DROWNING). He wrote also several works on diagnosis (1817), the circulation (1831), "The Inverse Ratio between Respiration and Irritability in the Animal Kingdom" (1832), and on the nervous system and its diseases. He died in Brighton, England, Aug. 11, 1857.

Hall, Robert, an English clergyman; born in Arnsby, Leicestershire, England, in 1764. He studied at the Baptist College at Bristol, and afterward at Aberdeen. In 1783 he became assistant pastor of Broadmead Church in Bristol, suffered for a time from mental alienation, recovered and became pastor of the Baptist Church at Cambridge, where he soon acquired a great reputation by his preaching and his writings, such as "Apology for the Freedom of the Press" (1793); "Modern Infidelity" (1800); "Reflections on War" (1802). He again became insane and resigned his charge, but recovering married and settled at Leicester in 1808, till in 1820 he was again called to Bristol. He died in 1831.

Hall, Samuel Carter, an English editor; born in Geneva Barracks, Waterford co., Ireland, May 9, 1800. Going to London from Ireland in 1822, he studied law, and became a reporter for the "New Times." He established the "Amulet" (1825), an annual, which he edited for several years; succeeded the poet Campbell as editor of the "New Monthly Magazine"; was subeditor of "John Bull"; and did other journalistic work before he founded and edited the "Art Journal" (1839–1880), which did much to create a public for art. Among the works written and edited jointly by Mr. and Mrs. S. C. Hall, exceeding 500 volumes, were: "Ireland, its Scenery, etc." (1841–1843); "The Book of Gems"; "British Ballads," one of the fine-art books of the century; and "Baronial Halls." He wrote also "A Retrospect of a Long Life" (1883). A testimonial of $8,000 was presented to him by friends in 1874, and in 1880 he received a civil-list pension of $750 a year. He died March 16, 1889. See HALL, ANNA M. F.

Hall, Thomas, an American inventor; born in Philadelphia, Pa., Feb. 4, 1834; was educated at the University of Pennsylvania; subsequently took a course in mechanics in Europe. His inventions include a mechanism for printing by touching keys; a keyed typewriter; the Hall typewriter; several sewing machines; drill-grinding and other machinist tools, etc.

Hallam, Henry, an English historian; born in Windsor, England, July 9, 1777. His father was dean of Bristol. After

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studying at Eton he was sent to the University of Oxford, where he distinguished himself by his classical attainments. He afterward settled in London, and entered on his career of literary labor as one of the first contributors to the "Edinburgh Review." His "View of the State of Europe during the Middle Ages" (1818) was the first great result of his studies and researches. His masterly work on the "Constitutional History of England" was given to the world in 1827. Hallam belonged to the Whig party in politics, but he preserved a singular calmness and exemption from political passions, and wrote with an impartiality which is rarely rivalled. In 1833

a very heavy blow fell on him in the death of his eldest son, a young man of high promise, and the chosen friend of Alfred Tennyson, whose love and sorrow are recorded in those exquisite lyrics which form his "In Memoriam." The next great work of Hallam, published in 1837–1839, was his "Introduction to the Literature of Europe in the 15th, 16th, and 17th Centuries." Other family bereavements followed in rapid succession, and after losing his daughter, his wife, and his second son (the last in 1850), the aged and mourning father himself died in Penshurst, Kent, England, Jan. 21, 1859.

Halle (häl'le), a city of Prussian Saxony, known as Halle an der Saale, to distinguish it from other places of the same name in Germany; on the right bank of the Saale and on several small islands of the river; 20 miles N. W. of Leipsic. As an important railway center, Halle has rapidly increased in size, industry, and prosperity. Its famous university was founded in 1694 by Frederick I. of Prussia; after having been suppressed by Napoleon in 1806, and again in 1813, it was reëstablished in 1815 and incorporated with the University of Wittenberg, which had been dissolved during the war. The Francke Institutions rank among the most important establishments of the place. The noteworthy buildings and institutions embrace St. Mary's Church (1529–1554); the Gothic church of St. Maurice, dating from the 12th century, with fine wood-carvings and sculptures; the red tower 276 feet high, in the market-place, with a Roland statue in front of it; the town-hall; the remains of the Moritzburg, built in 1484, the ancient residence of the archbishops of Magdeburg; a deaconesses' home; a large penitentiary; the medical institutes and clinical hospitals; the agricultural institute; the university library (220,000 vols.); a provincial museum; an art collection; and an archæological and other museums. The most important industrial product of Halle is salt, obtained from brine springs within and near the town, which have been worked from before the 7th century, and still yield about 114,500 hundredweight annually. The industries next in importance are machine-making, sugar-refining, printing, brewing, the manufacture of mineral oil, and fruit cultivation. A very active trade is carried on in machines, raw sugar, mineral oil, grain, and flour. Halle is the birthplace of Handel, the composer. Originally a border fortress against the Slavs, it became in the 10th century an appanage of the Archbishop of Magdeburg, and by the 12th century was famous as a commercial city. In that and the 13th century Halle was a powerful member of the Hanseatic League, and successfully withstood a fierce siege by the Archbishop of Magdeburg in 1435, but finally fell into his hands in 1478. Terribly impoverished during the Thirty Years' War, it was incorporated with Brandenburg at the peace of Westphalia. Pop. (1905) 169,916.

Hallé, Sir Charles, an eminent English pianist; born in Hagen, Westphalia, April 11, 1819. He studied first at Darmstadt, and from 1840 at Paris, where his reputation was established by his concerts of classical music. But the revolution of 1848 drove him to England, and he ultimately settled in Manchester. He and his highly-trained orchestra were ere long familiar to the music lovers of the kingdom from London to Aberdeen. He did much to raise the popular standard of musical taste by familiarizing the British public with the great masters of classical music. He was knighted in 1888. He died Oct. 25, 1895.

Hallé, Lady (hal-lā'), a famous violinist; known before she married Sir Charles Hallé in 1888 as Madame Norman-Néruda; born in Brünn, Moravia, in 1840. She came of a famous musical family. After studying under Jansa, she made her début at Vienna in 1846, and at once excited enthusiasm by her wonderful execution. Her first appearance in London was at a Philharmonic concert in 1849. Thenceforward her career was one long success, both in England and on the Continent. In 1901 she was appointed violinist to Queen Alexandra of England.

Halleck, Fitz-Greene, an American poet; born in Guilford, Conn., July 8, 1790. By his mother he was descended from John Eliot, "the apostle of the Indians." He became a clerk in a bank in New York in 1811, and in 1832 the private secretary of John Jacob Astor; in 1849 he retired, on an annuity of $200 left him by Astor, to his native town, where he spent the remainder of his days. From his boyhood Halleck wrote verses, and in 1819 he contributed with Joseph Rodman Drake, a series of humorous satirical papers in verse to the New York "Evening Post." In the same year he published his longest poem, "Fanny" (2d edition, enlarged, 1821), a satire on the literature, fashions, and politics of the time. He visited Europe in 1822, and in 1827 published anonymously an edition of his poems

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(3d edition, enlarged, 1845). In 1865 he published "Young America," a poem of 300 lines. His complete "Poetical Writings" was published in 1869. He died in Guildford, Conn., Nov. 19, 1867.

Halleck, Henry Wager, an American military officer; born in Westernville, N. Y., Jan. 16, 1815. He was graduated at the United States Military Academy in 1839. During the Mexican War he was employed in the operations on the Pacific coast, and for services was breveted captain in 1847. He took a leading part in organizing the State of California, became captain of engineers in 1853, left the service in 1854, and for some time practised law in San Francisco. On the outbreak of the Civil War he reëntered the army, and in November, 1861, was appointed Commander of the Department of the Missouri, which in a few weeks he reduced to order. In March, 1862, the Confederate first line had been carried from end to end, and Halleck's command was extended so as to embrace, under the name of the Department of the Mississippi, the vast stretch of territory between the Rocky Mountains and the Alleghanies. His services in the field ended with the capture of Corinth, with its 15 miles of intrenchments, in May, 1862. In July he became General-in-Chief of the armies of the United States; and henceforth he directed from Washington the movements of the generals in the field, till, in March, 1864, he was superseded by General Grant. Halleck was chief of staff till 1865, commanded the Military Division of the Pacific till 1869, and that of the South till his death, Jan. 9, 1872. His "Elements of Military Art and Science" (1846; new edition 1861) was much used during the Civil War; and he also published books on mining laws, etc.

Hälleflinta (hal″le-flin′-), a very hard compact rock, yellow, red, brown, green, gray, or black. It is composed of an intimate mixture of siliceous and felspathic matter, with occasionally scales of chlorite or mica. In hand-specimens it might be readily mistaken for a compact felsite, but in good sections in the field it generally occurs in thin beds and bands. It appears to be a metamorphic rock — in some cases an altered volcanic mud.

Hallelujah, Alleluia, or **Halleluiah,** an ascription of praise to God, occurring at the commencement of many psalms, as cvi., cxi., cxii., cxiii., etc. Hence it became a doxology in the Jewish synagogues. We read in the Book of Revelation that "much people in heaven" said Alleluia, as did the four and twenty elders and the four living creatures (Rev. xix: 1, 3, 4, 6), these coupling it with Amen. The verses just quoted aided Alleluia, or Hallelujah, in becoming what it now is, a doxology in the Christian Church, though the meaning is unknown to many who at times use it as an ejaculation.

Haller, Albrecht von (häl′ler), a Swiss anatomist; born in Bern, Switzerland, Oct. 16, 1708. He was a sickly but remarkably precocious child. After a severe course of study, at Tübingen, Leyden (where he graduated in 1727), London, Paris, Oxford, and Basel, he settled down to practise as a physician at Bern in 1729. There, in the course of seven years, his botanical researches, especially on the flora of Switzerland, and his anatomical investigations, spread his fame through Europe, and led to his being called (1736) to fill the chair of Medicine, Anatomy, Botany, and Surgery at the newly-founded University of Göttingen. Here he organized a botanical garden, an anatomical museum and theater, and an obstetrical school; helped to found the Göttingen Royal

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Academy of Sciences; wrote a great number of anatomical and physiological works; took an active part in the literary movement which culminated in the golden age of Goethe and Schiller; and interested himself in nearly all the questions of the day. In 1753 he resigned his offices and dignities at Göttingen and returned to Bern, where the rest of his life was spent, his energies being principally occupied with the duties of "amman" or magistrate. His name is particularly connected with muscular irritability, the circulation of the blood, and numerous excellent descriptions, of an anatomisco-physiological character, of important parts of the human body. He wrote: "Anatomical Idols" (1743–1750); "Minor Anatomical Works" (1762–1768); Anatomical Disputations" (1746–1752); "Elements of Human Physiology" (1757–1766); "On Respiration" (1746–1749); "Func-

tions of the Principal Parts of the Human Body" (1777–1778); "Pathological Works" (1755); "Botanical Works" (1749); etc. He died in Bern, Switzerland, Dec. 12, 1777.

Halley, Edmund, an English astronomer and mathematician; born in Haggerston, near London, England, Oct. 29, 1656. He received his education at St. Paul's School, and Queen's College, Oxford, where he attained so great a proficiency in mathematical studies that in 1676 he published observations on a spot in the sun by which the motions of that body on its axis were determined. The same year he went to St. Helena, where he determined the positions of 350 stars. On his return to England he was created master of arts and chosen a fellow of the Royal Society. In 1680 he made the tour of Europe with Mr. Nelson; and on the passage to Calais was the first to observe the great comet—which visited the Western hemisphere again in 1835 and 1910 (see COMET). After his return, he gave his attention to the theory of the planetary motions, which made him acquainted with Sir Isaac Newton, who intrusted to him the publication of his "Principia." To ascertain exactly the cause of the variation of the compass, he was made commander of a ship in 1698, and sent to the Western Ocean; but his crew being mutinous, he was obliged to return. The year following he sailed again, and proceeded as far as the ice would permit; the result of which observations he published in a general chart. In 1703 he was appointed Savilian Professor of Geometry at Oxford; in 1705 he made public his valuable researches on the orbits of comets; in 1713 he became secretary to the Royal Society; and in 1719 he succeeded Flamsteed as Astronomer Royal. The remainder of his life was chiefly spent in the sedulous performance of his duties in that situation, especially in completing the theory of the motion of the moon. His principal works are: "Catalogue of the Southern Stars," "Astronomical Tables," "An Abridgment of the History of Comets," etc. He died in 1742.

Halliday, Samuel Byram, an American Congregational minister; born in New Jersey, 1812. He was for nearly 20 years assistant of Henry Ward Beecher at Plymouth Church, Brooklyn. He wrote "The Little Street Sweeper"; "The Lost and Found" (1859); "Winning Souls" (1873); "The Church in America and its Baptisms of Fire"; etc. He died in Orange, N. J., July 9, 1897.

Halliwell-Phillipps, James Orchard, an English Shakespearean scholar and antiquary; born in Chelsea, London, June 21, 1820; the son of Thomas Halliwell. He was educated at Jesus College, Cambridge. His studies embraced the whole field of earlier English literature, plays, ballads, popular rhymes and folklore, chap-books, and English dialects, and its fruits remain in the publications of the old Shakespeare and Percy societies. In 1839 he was elected Fellow of the Royal and Antiquarian societies. Gradually he came to concentrate himself on Shakespeare alone and more particularly on the facts of his life, the successive editions of his "Outlines of the Life of Shakespeare" (1848; 8th ed. 1889) recording the growing results of his discoveries. In 1872 he took over the management of the property his wife (died 1879) inherited from her father, Thomas Phillipps, and assumed his father-in-law's name. Apart from Shakespeare, his "Nursery Rhymes and Nursery Tales of England" (1845) and "Dictionary of Archaic and Provincial Words" (1847; 6th ed. 1868) will keep his name from being forgotten. His magnificent edition in folio of the "Works of Shakespeare" (16 vols. 1853–1865) was published at a price prohibitive to most students. He died in Hollingbury Copse, near Brighton, England, Jan. 3, 1889.

Hallock, Charles, an American journalist; born in New York in 1834. He was founder and proprietor (1873–1880) of "Forest and Stream," and wrote "The Fishing Tourist" (1873), a guide for anglers; "Camp Life in Florida" (1875); "Our New Alaska" (1886); etc.

Hallock, William Allen, an American clergyman, noted as the lifelong secretary of the American Tract Society; born in Plainfield, Mass., June 2, 1794; published "Life of Harlan Page"; "Life of Moses Hallock"; "Life of Justin Edwards"; and many tracts. He died in New York, Oct. 2, 1880.

Hall of Odin, among the Scandinavian peoples, those rocks from which the Berserkers, when tired of life, flung themselves into the sea; so named because they were regarded as the portals of the Scandinavian Valhalla.

Hallowell, Richard Price, an American writer and merchant; born in Philadelphia, Pa., Dec. 16, 1835. He was a follower of Phillips and Garrison, and wrote much for the "Index." Works include: "The Quaker Invasion of Massachusetts" (1883), and "The Pioneer Quakers" (1887). He died Jan. 5, 1904.

Hallowe'en, the name popularly given to the eve or vigil of All Hallows, or festival of All Saints, which being Nov. 1, Hallowe'en is the evening of Oct. 31. In England and Scotland it was long consecrated to harmless fireside revelries, with many ceremonies for divining a future sweetheart. See Burns's "Hallowe'en."

Hallowmass (or **Hallowmas**), an abbreviation for All-hallows' mass; the 1st of November.

Halloysite, or **Halloylite,** a clayey or earthy mineral, white grayish, greenish, yellowish, bluish, or reddish; opaque or translucent, and of pearly to dull luster. Hardness, 14.2; sp. gr., 1.8–2.4. Composition: Silica, 37.12–39.50; alumina 22.05–41.27; water, 16.0–26.5, etc. Dana recognizes four varieties: (1) Ordinary Halloysite, including Galapectite, Pseudosteatite, and Glagerite; (2) Smectite, (3) Lenzinite, and (4) Bole. Occurs in many places in veins or beds of ore, or in granite.

Hallucinations. To realize in any proper way what memory is from the physiological point of view, we must assume that every impression on the senses is conducted by molecular movements through the nerves to the ultimate cells of the brain, which then undergo a certain molecular change that is revealed to consciousness as the qualities of the thing seen or heard or felt. By a process of instinctive reasoning the thing itself is thus instantly realized in the grown man, but not in the child. This molecular change in the cells may be evanescent, or it may be lasting. When lasting, the impression may be said to be "registered," so that it can come before consciousness again, and be "remembered." Each act of memory of the same impression in a healthy brain adds to the distinctness of the registration, and it is thus more and more easily recalled or suggested, either spontaneously or from without. The millions of brain cells contain an inconceivable number of such registered impressions of things seen, heard, touched, smelt, and tasted, besides the impressions of past states of feeling, past trains of thought, and recombinations of them by means of the imagination. It is in no way thought a strange thing that we can recall all these in memory at any time, or that by unconscious processes of association they project themselves across the field of consciousness irrespective of our wills. It is not thought so very strange that, when we take a dose of opium or cocaine, the registered images lying in the brain cells rise up and come across our consciousness so vividly that we cannot distinguish between them and real objects seen with the eyes. The same phenomenon often occurs in conditions of half sleep. In dreaming the impressions appear perfectly real to the half-consciousness existing at the time.

Now there are certain very sensitive people who have an element of the morbid in their brain condition or heredity similar to the morbidness caused by a dose of cocaine. This being so, what is the difficulty in believing that those registered brain images should stand out, and seem to the consciousness as real as the original impression, and so produce a hallucination, or a subjective impression from an image already in the brain that is practically the same to the consciousness as the impression from a real object? This is in no way more remarkable than memory itself. It is simply more unusual. It is very questionable whether the original acts of memory of the young child are not all of the nature of hallucinations. The after recollections of things seen and of things imagined are certainly so real to some children that they confuse them with things seen or experienced. If a man can by using tests, and by the use of his reason, be made to know that the thing that appears to be seen and real is not so, and has no objective existence where he sees it, and that it is his brain that is playing him a trick, he has a sane hallucination. If he cannot be made to do so, and thinks it a real object, he is insane to this extent. The condition of HYPNOTISM (*q. v.*) illustrates the origin of hallucinations better than almost anything else. Yet in the face of all these scientific facts and reasonable hypotheses and deductions we have persons calling in the aid of imaginary forces, "telepathy," "spirits," "psychic force," etc., to explain hallucinations, and associations formed for "psychical research," evidently on the theory that there can be a cause for hallucinations other than the registered images in the brain itself, together with altered conditions of consciousness. Many religious leaders and others in a state of intense brain excitement from religious or other causes have had hallucinations, after they had been sinning against nature's laws by depriving themselves of sleep and of exercise, and by exposing themselves to the contagion of morbid feeling interspersed by reason or common sense. Luther's seeing the devil, and throwing his ink-bottle at him, and Swedenborg's seeing spiritual beings among the ministers at the council board are certainly explicable on the theory of suggestion and a temporary morbidness of brain working.

But, say the telepathists, "two people have had the same hallucination at the same moment. How can that be explained on brain cell principles?" If two people had been thinking of the same thing — for example, a dear friend or relative of both who was ill and supposed to be dying — and if both were sensitive persons, and their feelings were very excited at the time, what marvel is it if through a rare coincidence they had seen the form of the dying friend? And if this impression happened to be near the time when he died, is

it remarkable in the unscientific state of most minds that they made out it was the same moment that they both saw their friend's form appear and walk out at the door? When such duplicate hallucinations are probed by hard scientific methods it is always found that the hour of seeing them by the two people was not quite the same, that one had previously made a suggestion to the other forgotten in the excitement of the moment, or that the figures seen by them had on different clothing, or had quite different beards. Without far more evidence than has been brought forward by the pseudo-scientific believers in ghosts and apparitions, an age of science will never admit a hallucination to be anything but a brain phenomenon, obscure perhaps, but no more obscure than many other correlated facts of brain and mind. Every advance that is made in our knowledge of the brain and its working in relation to mind renders the rational and scientific explanation of all the hallucinations of the sane recorded by trustworthy, unbiased observers more easy and probable, and makes less excusable the calling in to explain the facts of new and unknown "forces" or "influences" in nature beyond those we know and can scientifically investigate. Hallucinations may be of all the senses, and may be of every degree of variety and complication, from flashes of light to armies of men, from hummings in the ear to strains of "celestial music." But it has never been proved, as ought certainly to have occurred if there was any reality in those occult forces, that anything has ever been seen or heard by anyone which the person might not possibly have seen or imagined previously, so that its image might be lying registered in his brain cells; and no new knowledge has ever come to humanity from such sources. Hallucinations were much more common among primitive peoples and in the early ages of the world than they are now. See INSANITY.

Hallue (ä-lü′), a French river, noted for the battle on its banks in 1870 between the French and Germans.

Halm, Friedrich. See MÜNCH-BELLINGHAUSEN.

Halmaturus, a sub-genus of kangaroos, genus *Macropus*. *H.* or *M. antilopinus*, the antelopian kangaroo; has short, stiff horns like those of some antelopes. It inhabits the N. of Australia. *H. elegans* (*Macropus ruficollis*) is the red-necked kangaroo of New South Wales.

Halo, Parhelion, or **Corona,** various meteorological phenomena. For corona as a solar phenomenon, see under SUN. One class of halo is very common. When the sun or moon is partially obscured by a mist or cloud, the latter not being of the species called cirrus or curl-cloud, it is almost invariably surrounded by colored rings of a few degrees only in diameter, called *Coronæ* (crowns). Those surrounding the sun cannot always be seen directly, but by reflection at the surface of still water, or of a glass plate blackened at the back, the glare of the sunlight is sufficiently diminished to permit the halo to be seen. This meteor depends on the diffraction of light, caused by the small spheres or vesicles of water which compose the cloud, and can easily be imitated by looking at a bright object through a piece of glass which has been breathed on, or dusted with lycopodium seed. If the diffracting particles be all of the same size, the rings are well marked; but since they become smaller as the particles increase in size, ordinary fogs and clouds, which generally contain particles of very different dimensions, give a composite effect which spoils the distinctness and greatly limits the number of the rings. Thus, no general rule can be given for the number of colors of the halo, but it may be observed that their diminution in diameter is a sign of the increase in size of the watery spheres which cause them, and therefore in general betokens approaching rain, which comes when the particles are no longer able, on account of their size, to float in the air without sensibly falling. A different form of halo is sometimes seen to surround the shadow of the spectator's head, when cast by the sun on a bank of fog; in this case it is sometimes called a "glory." To this class belong the colors generally seen about the famous "Specter of the Brocken."

Halogen, the electro-negative radical of a haloid salt. This term is also used for the monad elements chlorine, bromine, iodine, and fluorine, as their sodium salts resemble sea salt, which is chloride of sodium, NaCl. The physical properties of Cl, Br, and I, correspond with the difference of their atomic weights, Cl 35.5, Br 80, and I 127, the weight of bromine vapor being the mean of that of chlorine and iodine. Chloride is a gas, bromine a liquid, and iodine a solid at ordinary temperatures. Chlorine has the greatest chemical affinity for hydrogen, and iodine for oxygen, that of bromine being intermediate.

Haloscope, an instrument invented by M. Bravais for exhibiting the phenomena connected with halos, perihelia, etc. It comprises prisms and a mirror, which revolve rapidly about an axis, and two plates of glass for intercepting the light. The rotating prisms receive the light from a lamp in a darkened chamber, the refracted rays assuming the form of the perihelion circle.

Halpine, Charles Graham (pseudonym) MILES O'REILLY, an Irish-American author; born in Ireland in November, 1829. He was the son of Rev. Nicholas Halpine and was educated in Dublin. He came to the United States at 23 and became a New York journalist. He served through the Civil War, attaining the rank of colonel. His writings include: "Lyrics"; "Poems"; "Miles O'Reilly's Papers"; "Life and Adventures of Private Miles O'Reilly"; "Baked Meats of the Funeral"; "Poetical Works"; etc. He died in New York city Aug. 3, 1868.

Hals, Franz (häls), the ELDER, a Dutch portrait and genre painter; born, probably in Antwerp, in 1580 or 1581. He studied under Karel van Mander and, according to some accounts, under Rubens. In his later years, in spite of his unceasing industry, he fell into poverty and was relieved by the municipality of Haarlem, who in 1664 bestowed on him a pension of 200 florins. Hals is usually regarded as the founder of the Dutch school of genre-painting. Of his portrait groups eight noble examples are preserved in the museum of Haarlem. The "Mandoline Player" (1630), in the gallery of Amsterdam, is a typical example of his treatment of single figures. As a teacher he exercised a marked influence on the development of Dutch art, Jan Verspronck, Van der Helst, Adrian van Ostade, Adrian Brouwer, and Wouwerman having been his pupils. He died in Haarlem, Netherlands, in August, 1666.

His brother, DIRK HALS (before 1600–1656), a pupil of Abraham Bloemaert, was also an excellent genre painter; and several of Frans's sons were artists, the most celebrated being Frans Hals, the Younger, who flourished from about 1637 to 1669.

Halstead, Murat, an American journalist; born in Ross, Butler co., O., Sept. 2, 1829. He spent his minority on a farm. At 18 he began writing for newspapers. In 1851 he finished his schooling at Farmers' College, near Cincinnati, and then decided to study law. He did local newspaper reporting on several Cincinnati papers, and in 1853 became manager of a department on the Cincinnati "Commercial." The following year he acquired a small interest in the paper, and it began rapidly to increase in circulation and influence, so that in 1866 it was considered one of the most potent newspapers in the West. The "Commercial" combining with the "Gazette," its rival, the Cincinnati "Commercial Gazette" became the recognized organ of the Ohio Republicans. In 1890 he removed to Brooklyn, N. Y., and edited the "Union" newspaper. He wrote: "The Story of Cuba"; "Life of William McKinley"; "The Story of the Philippines"; "History of American Expansion"; "Life of Admiral Dewey"; "The Boer and British War"; etc. He died July 2, 1908.

Halyburton, Thomas, a Scotch clergyman; born in Dupplin, near Perth, Scotland, Dec. 25, 1674. He was for 11 years minister of Ceres in Fife, and then for two years Professor of Divinity at St. Andrews. He was the author of several works, including "Natural Religion Insufficient and Revealed Necessary to Man's Happiness"; "The Great Concern of Salvation"; and "Ten Sermons Preached Before and After the Celebration of the Lord's Supper." The works, especially the autobiographic memoir, of the "Holy Halyburton" were once very popular among the people of Scotland; and even at the present day they are still read. He died in St. Andrews, Scotland, Sept. 23, 1712.

Ham (Hebrew, burnt, swarthy, black), a son of Noah. The impiety revealed in his conduct toward his father drew on him, or, rather, according to the Bible statement, on his son Canaan, a prophetic malediction (Gen ix:20–27). Ham was the father of Cush, Mizraim, Phut, and Canaan, that is, the ancestor of the Canaanites, Southern Arabians, Ethiopians, Egyptians and the Africans in general (Gen. x: 6–20).

Ham (äm), a town in France, department of Somme, on the river of that name, 12 miles S. W. of St. Quentin. Its ancient fortress or castle was rebuilt by the Comte de Saint Pol in 1470, and now is used as a state prison. It is memorable as the place of confinement of Joan of Arc, Moncey, and others; of Polignac, Peyronnet, and Guernon de Ranville from 1831 to 1836; of Louis Napoleon from 1840 till 1846; and after the coup d'état, of the republican generals Cavaignac, Lamoricière, Changarnier, etc.

Ham, West, a suburb of East London, and a parliamentary and county borough of Essex, England, on the Thames, opposite Greenwich. In 60 years its population grew from 10,000 to 267,308 (1901), principally owing to the Victoria and Albert docks and the gas works. It is a busy industrial parish, and has silk printing, shipbuilding, distilling, and chemical manufactures.

Hamadan (hä-mä-dän′), a town of Persia, in the province of Irak Ajemi, situated at the N. base of Mount Elwend, 160 miles W. S. W. of Teheran. It contains Avicenna's tomb, and others affirmed to be those of Mordecai and Esther. Being the center of converging routes from Bagdad, Erivan, Teheran, and Ispahan, it is the seat of a large transit trade; and it carries on extensive manufactures of leather, and in a less degree of coarse carpets and woolen and cotton fabrics. Hamadan is generally believed to occupy the site of the Median ECBATANA (*q. v.*). Pop. 25,000 to 30,000.

Hamadryad (ham′-), in Greek and Roman mythology, a wood-nymph, supposed by the Greek and Roman poets to live and die with the tree to which she was attached.

Hamadryas, a name given to a kind of baboon; and the *H.* or *Ophiophagus elaps* is the largest poisonous snake of the Old World, larger and more dangerous than any of the cobras, with which it has almost the same geographical range.

Hamah (hä′mä), a very ancient city of Syria, on the Orontes, 110 miles N. by E. of Damascus; the Hamath of the Bible. The town stands in the midst of gardens, though the streets are narrow and irregular, and the houses are built of sun-dried bricks and wood. The inhabitants manufacture coarse woolen mantles and yarn, and carry on considerable trade with the Bedouins. Hamah seems to have come very early in conflict with the Assyrians, having been taken by them in 854 B. C. and again in 743, while two revolts of the people were crushed by the Assyrians in 740 and 720 B. C. After the Græco-Macedonian conquest of Syria, Hamah became known as Epiphania. In 639 it fell into Moslem hands, and, though it was held by Tancred from 1108 to 1115, it was again taken possession of by the Moslems. Abulfeda, the Arab geographer, was prince of Hamah in the 14th century. Four stones were discovered there in 1812 by Burckhardt, bearing inscriptions in an unknown language, now believed to be Hittite. Pop. about 45,000.

Haman (hā′man), a favorite of Ahasuerus, King of Persia. In order to revenge himself on Mordecai the Jew, he plotted the extermination of all the Jews in the kingdom; but in the providence of God he was thwarted by Esther, fell into disgrace with the king, and wrought his own ruin and the upbuilding of the Jews, B. C. about 485.

Hamburg (häm′bŏrg), one of the free cities of Germany, a member of the German empire, and the greatest commercial port on the continent of Europe; about 80 miles from the North Sea, on the N. branch of the Elbe. The town of Altona adjoins it on the W. From the Elbe proceed canals which intersect the E. and lower part of the city in all directions, and it is also intersected by the Alster, which here forms two streams, the Binnenalster and Aussenalster. The quays and harbor accommodation are very extensive. After the destructive fire of 1842 whole streets were rebuilt in a magnificent and expensive style. The most important public buildings are the church of St. Nicholas, a noble Gothic structure with a lofty tower and spire, built between 1845 and 1874; St. Peter's, another lofty Gothic edifice; St. Michael's, the largest of the churches; St. Catherine's, an ancient edifice; St. James', erected in 1354, but surmounted by a modern tower; an elegant Jewish temple; an exchange, a noble edifice, consisting chiefly of a magnificent hall, surrounded by a fine colonnade. There are also the Johanneum institution, containing an ancient college, museums, and the city library, with about 300,000 volumes; several well-endowed hospitals; zoölogical and botanic gardens; the Kunsthalle, a large collection of pictures and sculpture, theaters, etc. Hamburg is of most importance on account of its great shipping trade and the business of banking, exchange, marine assurance, etc., carried on in connection with that. Its manufactures, though large, are less important, including shipbuilding, tobacco and cigar making, iron-founding, brewing, etc. The total value of imports in 1898 was 125,486,720 marks, and of exports 65,667,800 marks; the total number of vessels which entered and cleared in 1898 was 12,523, with a tonnage of 7,354,118. The city owes its foundation to the emperor Charlemagne, who (808–811) built a citadel and a church on the heights between the Elbe and the E. bank of the Alster, as a bulwark against the neighboring pagans. It became important as a commercial city in the 12th century, and in the 13th it combined with Lübeck in forming the Hanseatic League. In 1618 Hamburg was formally acknowledged a free city of the Empire. During the Thirty Years' War its population and prosperity continued to increase on account of the immunity of its position, and in the following century it obtained a large share of the trade with North America. In 1810 it was formally incorporated in the French empire along with the N. W. part of Germany. In 1815 it joined the Germanic Confederation as a free city. In 1888 the city was included in the Zollverein or German Customs Union. Pop. (1910) 936,000.

Hameln (hä′meln), a town and formerly a fortress of Hanover, Prussia, on the Weser; 25 miles S. W. of Hanover. It presents a mediæval appearance, having many houses and buildings surviving from the Gothic and Renaissance periods of architecture. The chain bridge which here crosses the Weser was completed in 1839, and is about 840 feet in length. The chief employments of the people are machine making, iron founding, wool spinning, fish breeding, brewing, and the manufacture of leather, paper, artificial manure, and chemicals. In the earliest times Hameln belonged to the Abbey of Fulda, and was a member of the Hanseatic Confederation. It suffered severely during the Thirty Years' War. With this town is connected the well-known legend of the Piper (or Ratcatcher) of Hameln, who in 1284 freed the town from rats through

the mystic charm of his pipe; but, when the people refused to pay him the promised reward, he exercised the power of his music on the children of the place, and drew them away into the heart of an adjoining hill, which opened to receive them, and through which he led them to Transylvania. The story is familiar from Browning's "Pied Piper of Hamelin." Pop. (1905) 20,738.

Hamerling, Robert (hä'mer-ling), an Austrian poet; born in Kirchberg-am-Walde, March 24, 1830. Of humble parents, but reared and well educated in Vienna, he gained influential patronage by poems published at 20, and became a lecturer in the University of Trieste; but retiring on account of illness, was pensioned during the next 20 years. He produced poems, plays, and romances, which rank him among the first poets of "the new time," for thought, euphony, and technique. His greatest work is "Ahasuerus in Rome" (1866), a vivid epic of Nero's time and the dying paganism. The later "King of Zion" in hexameters; "Cupid and Psyche"; and "Homunculus," a satire on the unspirituality of the present age, are worthy his genius. "Aspasia" is a powerful, graphic, and erudite, but sometimes tedious, picture of Hellenic life and manners in Pericles's time. "The Seven Deadly Sins" is a noteworthy but minor flight of fancy. In his latter years he published an autobiography, "Stages of My Life Pilgrimage." He died in Gratz, July 13, 1889.

Hamerton, Philip Gilbert, an English writer on art; born in Laneside, Lancashire, England, Sept. 10, 1834. He was educated at the grammar schools of Burnley and Doncaster, and at first intended to proceed to Oxford. His taste for art, however, led him to abandon that intention, and for a time he studied landscape painting, but deviated into literature, publishing a work on "Heraldry" in 1851, and in 1855 "The Isles of Loch Awe and Other Poems."

In 1859 Mr. Hamerton was married to a French lady, and thereafter resided chiefly at Autun, where he died. He made himself well known to the English public as a writer on art in the "Fine Arts Quarterly Review," the "Fortnightly Review," the "Saturday Review," and other periodicals. Among his works are: "A Painter's Camp in the Highlands, and Thoughts About Art" (1862). In 1868 he published "Etching and Etchers" and "Contemporary French Painters"; a continuation of the latter appeared in the following year, "Painting in France After the Decline of Classicism." He also wrote a biography of J. M. W. Turner. After 1869 he edited the "Portfolio," an art journal which gives special prominence to etchings. "The Intellectual Life" (1873) is in the form of letters of advice, illustrated by many examples, adressed to literary aspirants and others, of every class and in all circumstances. He wrote also "Human Intercourse" (1884), a volume of essays on social subjects, many of them dealing with intercourse as affected by nationality; "The Graphic Arts" (1882); "Landscape" (1885); "Portfolio Papers" (1889); "French and English" (1889), and a couple of novels. He died Nov. 6, 1894.

Hames, an old Lincolnshire, England, name for a flail, an instrument for threshing or beating grain from the ear by hand. The old saying, "to set the thames on fire," takes its origin from this word, and has nothing whatever to do with the river Thames. It was first used with reference to a man who was locally known as a braggart, a man who did considerably more talking than working. Hence, "He'll never set t'hames on fire," meant he will never whirl the hames or flails fast enough to set them on fire.

Hamesucken, a Scotch law term, denoting the offense of feloniously assaulting a man in his own house or lodgings. This was an aggravation of the ordinary offense of assault.

Hamilcar (ha-mil'kär), the name of several Carthaginian generals, of whom the most celebrated was Hamilcar, surnamed Barca (the lightning), the father of the great Hannibal. While quite a young man he was appointed to the command of the Carthaginian forces in Sicily, in the 18th year of the first Punic War, 247 B. C., when the Romans were masters of almost the whole island. For two years he defied all the efforts of the Romans to dislodge him; but the Carthaginian admiral, Hanno, having been totally defeated off the Ægates, 241 B. C., he reluctantly consented to evacuate Sicily. A revolt of the returned troops, joined by the native Africans, was successfully repressed by Hamilcar. He then entered on a series of campaigns in Spain, where he founded a new empire for Carthage. Here he passed nine years, and had brought the whole southern and eastern part of the country under Carthaginian rule when he was slain in battle against the Vettones, 229 B. C. His great design of making Spain a point of attack against

HAMILCAR.

Hamilton

Rome was ably carried out by his son, the great Hannibal, to whom, in military capacity, modern historians regard him as having been almost equal.

Hamilton, a town in the Bermudas, of which it is the capital. It is on the Great Bermuda, and was founded in 1790. Pop. (1901) 2,246.

Hamilton, a village of New York; situated in Madison co., on the New York, Ontario, and Western railroad, 28 miles S. W. of Utica; named in honor of Alexander Hamilton. It is situated in a fertile agricultural region, and its principal industrial establishments are a canning factory, a lumber yard, and marble works. Here is a quarry from which good building stone is taken. Hamilton is the seat of Colgate University (Baptist), with its theological seminary. Settled in 1792, Hamilton was set off from Paris township in 1795, and in 1816 it was incorporated as a village. It has water works and an electric light plant, owned and operated by the municipality, and a free library. Pop. (1890) 1,744; (1900) 1,627.

Hamilton, a city of Ohio, the county-seat of Butler co.; situated on the Great Miami river and on the Miami and Erie canal, the Pittsburg, Cincinnati, Chicago, and St. Louis, and the Cincinnati, Hamilton, and Dayton railroads; 25 miles N. of Cincinnati. It is in an excellent agricultural section, and has an active trade in various farm products. The river affords extensive water power, which is utilized in the manufacture of lumber, railroad supplies, machinery, tools, wagons and carriages, agricultural implements, engines, casters, wire goods, paper, woolen goods, beer, etc. According to the United States Census of Manufactures for 1905, there were in that year 114 establishments, with a capital of $19,436,447, employing 6,207 wage-earners at wages aggregating $3,369,151. The cost of materials used was $6,502,057, and the value of the product $13,992,574. Hamilton has a court house, excellent schools, a hospital, a free library, and daily and weekly newspapers. The gas and electric light plants and water works are owned and operated by the city. The place was first settled in 1791, when Fort Hamilton, named in honor of Alexander Hamilton, was built by Gen. Arthur Saint Clair. The town was incorporated in 1810, and the present city charter was obtained in 1898. Pop. (1890) 17,565; (1900) 23,914; (1910) 35,279.

Hamilton, a city of Ontario, Canada, a port of entry, and the county-seat of Wentworth co.; on the Grand Trunk, Canadian Pacific, Michigan Central, New York Central, and two other railroads; 50 miles S. W. of Toronto. Three electric railways enter the city, and through its water communications, which include six lines of steamships, it carries on an extensive trade with the principal lake ports of the United States and Canada. Hamilton is situated upon a plain that slopes upward from the shores of Burlington bay, a landlocked harbor at the head of Lake Ontario. The city is well laid out in streets that are rectangular to each other, and is adorned with fine squares and seven parks. Area, about 4,500 acres. The hilly range, here called "the Mountain," at whose base the city lies embraces the escarpment over which plunge Niagara falls, 42 miles to the E. Burlington Beach, Hamilton's favorite summer resort, is near by. Grimsby park, a great Methodist resort, is 16 miles distant. The city is in the center of a fertile grain-growing and fruit-producing district which is called the "Garden of Canada."

Buildings and Institutions.—The most noteworthy buildings include the Bank of Hamilton, Federal Life building, court house, public library, Anglican and Roman Catholic cathedrals, Hamilton Provident and Loan building, custom house, Grand Opera House, Ontario Normal College, city hall, city hospital, Drill Hall, Dominion Government building, and an insane asylum. Dundurn park and castle, on the Mountain, are places of interest, the castle containing the museum of the Wentworth Historical Society. Other parks and places of scenic interest in or near the city are Victoria park, Harvey park, Hamilton Jockey Club and park, Burlington Heights, High Level bridge, and the golf links. Gore park is beautifully laid out. Besides the Anglican and Roman Catholic cathedrals, there are several other handsome churches. There are 10 Anglican, 5 Roman Catholic, 10 Presbyterian, 10 Methodist, and 7 Baptist churches. In addition to the Ontario Normal College, the educational facilities include the public library, Collegiate Institute, Canada Business College, Hamilton Ladies' College, and several other high-grade schools. About 7,500 pupils are in attendance at the public schools. There are 4 theaters, over 90 hotels, and several clubs and class organizations. Among the 26 charitable institutions are the City and St. Joseph's hospitals, House of Providence, asylum for the insane, House of Refuge, 2 orphan asylums, Girls' Home, etc. There are 3 daily newspapers, the "Spectator," "Times," and "Herald," and 4 weeklies.

Industry and Commerce.—Hamilton is one of the leading manufacturing cities of the Dominion, and claims to have more American capital invested in its industries than all the other cities of Ontario combined. Electric power for the majority of the factories, for lighting, and for running the electric railways is obtained by utilizing the waters of De Cew falls, 35 miles S. E. of the city. There are about 300 manufactur-

ing establishments. The chief articles of manufacture are agricultural implements, electrical appliances, iron and steel and their manufactures, elevators, tools, machinery, wire fencing, carriages and wagons, cream separators, clothing, boots and shoes, wood and leather work, textiles, glassware and pottery. In 1906, according to the Dominion census, the value of manufactured articles was $24,625,776, as compared with $17,122,346 in 1901, an increase of 43 per cent. In 1906 the number of industrial establishments was 432, employing 12,000 hands, and the amount of capital invested in manufacturing was $27,513,817. There are 19 miles of street railway. The health of the city is remarkably good, sanitation being aided by the gradual slope of the land downward toward the bay. There are 71 miles of sewers. The water supply is obtained from three reservoirs, the pumping capacity of the water works is 15,000,000 gallons per day, and there are 120 miles of water mains. The fire and police departments are each operated by a staff of 57 men. The city's finances are in a healthy condition, the total assets in 1905 being $6,232,673; the total debt, $4,444,358; and the total expenditure for 1905, $1,709,018. The site of Hamilton is said to have been first visited by La Salle in 1669, but there was no English-speaking settler until 1778, when Robert Land came there from the State of New York. The site was first surveyed in 1791, when it was occupied by 31 families. In 1846 the population was 6,832, and on June 9 of that year Hamilton was incorporated as a city. Pop. (1901) 52,634; est. (1907) 62,000.

Hamilton, a town of Lanarkshire, Scotland, on the Clyde; 10 miles S. E. of Glasgow. The principal edifice is the burgh buildings (1863), with a clock-tower nearly 130 feet high; and there are also the county buildings, large barracks, and a good racecourse. The former manufactures of lace, tamboured bobbinet, and cambric have declined; and mining is now the chief industry of the district. Hamilton was made a royal burgh in 1548, and one of the five Falkirk parliamentary burghs in 1832. Hamilton Palace, successor to Cadzow Castle, is the seat of the Duke of Hamilton. Dating partly from 1594, but greatly enlarged in 1705 and 1822, it is a sumptuous classical structure, though its choicest art collections were sold in 1882 for nearly $2,000,000. Within its policies are a superb mausoleum (1852), the ruins of Cadzow Castle, the herd of wild white cattle, and some primeval oaks. Pop. (1901) 32,775.

Hamilton, a town of Victoria, Australia, capital of Dundas and Normandy counties; on Grange Burn Creek, 198 miles W. of Melbourne. Two pastoral and agricultural exhibitions are held here annually, and two race-meetings. Pop. (1901) 4,026.

Hamilton

Hamilton, Family of, a family long connected with Scotland, though probably of English origin, the name being evidently territorial. The first person of the name in Scotland of whom we have reliable information was Walter Fitz-Gilbert of Hamilton, who in 1296 swore fealty to Edward I. of England. In 1445 the family was ennobled in the person of Sir James Hamilton of Cadyow, who was created Lord Hamilton of Cadyow. At first he adhered to the Douglases against the crown; but, deserting them opportunely, he was rewarded by large grants of their forfeited lands, and at a later period by the hand of the Princess Mary, eldest daughter of King James II., and widow of Thomas Boyd, Earl of Arran. He died in 1479. James, the 3rd Marquis of Hamilton, one of the ablest and most distinguished of the family, created Duke of Hamilton in 1643 by Charles I., was taken prisoner by the parliamentary forces soon after the battle of Preston, and beheaded in March, 1649. William Alexander Louis Stephen Douglas Hamilton, 12th Duke of Hamilton in the peerage of Scotland, and 9th Duke of Brandon in the peerage of Great Britain, is premier peer of Scotland, and hereditary keeper of Holyrood House. The ennobled offshoots of the main branch of the Hamiltons are numerous and distinguished. Among these are the Dukes of Abercorn, the Earls of Selkirk, Orkney, and Haddington, and the Viscounts Boyne.

Hamilton, Alexander, an American statesman; born in Nevis, W. I., Jan. 11, 1757. In 1772 he was sent to Elizabethtown, N. J., to a grammar school, and in 1773 entered King's College (now Columbia University). When the Revolution broke out he was appointed (1776) captain of artillery, and in 1777 was made a member of Washington's staff, with the rank of lieutenant-colonel. In 1780 he married a daughter of General Schuyler. Being reproved by Washington for some slight matter, he resigned his commission, but the next year was in command of a battalion of infantry, engaging in the battle of Yorktown. In 1782 he was for a time receiver of Continental taxes in New York State, and in 1782-83 was a member of the Continental Congress, in which he took a prominent part in debates on financial matters and served on various committees. After a short period of study, he was admitted to the bar at Albany in 1782, and after leaving Congress he took up practice in New York. In 1786 he was elected to the State legislature. He served in the convention that framed the National Constitution, where he led the sentiment in favor of a strong federal government as against a mere union of States. He wrote the greater number of papers collected in "The Federalist," that exerted great influence in bringing the

States to accept the Constitution, and became the leader of the Federalist party. He was made the first Secretary of the Treasury under Washington. He was by this time ranked with Washington, Jefferson, and Franklin, as one of the four great Americans of his day. His position as the leader of the Federalist party brought him into conflict with Jefferson and Monroe, but he nevertheless supported Jefferson in the election contest between him and Burr in the House of Representatives, and partly by his influence Burr was defeated. He became inspector-general of the army in 1798. He was

ALEXANDER HAMILTON.

one of the founders of the Society of the Cincinnati, of which, in 1800, he became President-General. In 1804 he exerted his influence to defeat Aaron Burr, who was a candidate for governor of New York. Burr challenged Hamilton to a duel, in which he was mortally wounded by Burr's first fire, and died the following day, July 11, 1804.

Hamilton, Count Anthony, a French poet, courtier, and man of letters, descended from a younger branch of the family of the Scottish dukes of Hamilton; born in Ireland about 1646. After the death of Charles I. he went with his parents to France, but after the accession of Charles II. made frequent visits to England, and was appointed governor of Limerick by James II. Afterward, on the ruin of the royal cause, he accompanied the king to France. His talents and agreeable manners made him a favorite in the best circles. Count Hamilton is chiefly known by his "Memoirs of Count Grammont" (his brother-in-law), a lively and skillful picture of the frivolous life at the French and English courts of the time. The count's other works are "Poems" and "Fairy Tales" (burlesque), which, as well as the "Memoirs," are in French, and are also remarkable for their fine wit and elegance of style. He died in St. Germain, France, Aug. 6, 1720.

Hamilton, Edward John, an American educator; born in Belfast, Ireland, Nov. 29, 1834; was graduated at Hanover College, Ind., in 1853, and at Princeton Theological Seminary in 1858; was chaplain of the 7th New Jersey Volunteers in the Civil War; Professor of Mental Philosophy at Hanover College in 1868-1879, and of Philosophy at Hamilton College, New York, in 1883-1891; accepted the latter chair in the State University of Washington in 1895. He is the author of "Perceptionism" (a system of metaphysical philosophy); "The Human Mind"; "The Modalist"; "Mental Science"; "A New Analysis in Fundamental Morals"; etc.

Hamilton, Elizabeth, a British author; born of a Scottish family in Belfast, July 21, 1758. She resided in various parts of Scotland and in London. Her works comprise "Letters of a Hindu Rajah" (1796); "Memoirs of Modern Philosophers" (1800); "Letters on Education" (1802); "Life of Agrippina" (1804); "Letters on the Moral and Religious Principle" (1806); and — the work by which she is best known — "The Cottagers of Glenburnie" (1808), a singularly vivid and life-like representation of humble rural life in Scotland. She died in Edinburgh, Scotland, July 23, 1816.

Hamilton, Lady Emma, born Amy Lyon, an English adventuress; born probably in Ness, Cheshire, England, April 26, 1763. She had had three places in London, had borne two children to a navy captain and a baronet, and had posed as Hygeia in a quack-doctor's "Temple of Health," when in 1782 she accepted the protection of the Hon. Charles Greville (1749-1809), to exchange it in 1786 for that of his uncle, Sir William Hamilton (1730-1803). After five years at Naples, in 1791 she was married at Marylebone Church to her elderly ambassador, and, returning to Italy, was straightway admitted to the closest intimacy by Maria Caroline, the queen of Ferdinand I. Her "eminent services" to the British fleet during 1796-1798 in furnishing information and procuring supplies were extolled by Lord Nelson and vaunted by herself. Nelson had first met her in 1793; and gradually Platonic friendship ripened to guilty passion, till, four months after the trio's return to England, she gave birth to a daughter (1801-1881), "our beloved Horatia," so Nelson writes of her in a holograph letter to "my own dear Wife, in my eyes and the face of Heaven." Her credulous husband's death, followed four years later by Nelson's, left Emma mistress of $10,000 a year; but by 1808 she was owing $90,000, and in 1813 was arrested for debt. Next year she escaped to Calais, where she

died in penury, Jan. 15, 1815. See HAMILTON, SIR WILLIAM.

Hamilton, Frank Hastings, an American surgeon; born in Wilmington, Vt., Sept. 10, 1813. He was graduated from the medical department of the University of Pennsylvania in 1833, and first practised in Auburn, N. Y. In 1844 he went to Buffalo, and, with Dr. Austin Flint and Dr. James Platt White, established the medical department of the University of Buffalo. He removed to Brooklyn in 1860, and was the first Professor of Surgery in the Long Island College Hospital. In 1861 he went to the war as surgeon of the 31st New York Volunteers and was made brigade surgeon after the battle of Bull Run, and surgeon of General Keyes's corps in 1862. A year later he was made medical inspector of the United States army. He was one of the founders of Bellevue Hospital Medical College in 1861, and was Professor of Surgery there till he resigned in 1875. Dr. Hamilton was associated with Drs. Agnew and Bliss in the care of President Garfield. He wrote extensively on the principles and practice of surgery, his works being regarded as standards on the subjects treated. He died in New York city, Aug. 11, 1886.

Hamilton, Gail. See DODGE, MARY ABIGAIL.

Hamilton, Gavin, a Scotch painter; born in Lanark, Scotland, about 1730. He studied at Rome, devoting himself to historic painting. In 1773 he published at Rome a folio volume, "The Italian School of Painting," illustrated with splendid plates. His illustrations of Homer are among his best productions. He was very successful also as a discoverer of classical antiquities. He died at Rome in 1797.

Hamilton, James, an English merchant; born in London, England, in 1769. Having been taught German at Hamburg in 1798 by an original method, he afterward exchanged mercantile pursuits for the teaching of languages, and taught with great success in the United States (from 1814) and in England (from 1823). He discarded grammar, using in its stead a literal word for word translation, placed immediately below the original, line for line alternately. His own account of it is to be found in "The Principles, Practices, and Results of the Hamiltonian System" (Manchester, 1829). He died in Dublin, Oct. 31, 1831.

Hamilton, James, an American statesman; born in 1786; was a member of Congress from South Carolina in 1822–1829; governor of South Carolina in 1830–1832; later settled in Texas; he advocated States rights and nullification. He was drowned in 1857.

Hamilton

Hamilton, John Church, an American biographer and historian, son of Alexander Hamilton; born in Philadelphia, Pa., Aug. 22, 1792. Besides editing his father's works (1851), he wrote: "Memoirs and Life of Alexander Hamilton" (1834–1840); "History of the Republic" (4th ed. 1879); "The Prairie Province" (1876), sketches of travel. He died in Long Branch, N. J., July 25, 1882.

Hamilton, Patrick, usually considered as the first Scotch reformer, the second son of Sir Patrick Hamilton of Kincavel and Stanehouse, and of Catharine, daughter of the Duke of Albany, second son of James II.; born probably in Glasgow in 1504. He was educated partly at St. Andrews and partly at Paris, where he took his degree in 1520. While still a boy he had been appointed Abbot of Fearn, in Rosshire, but never went into residence, settling instead at St. Andrews in 1523. Here he began to announce his firm belief in the principles of the Reformation, and was summoned in 1527 by Archbishop Beaton to stand his trial for heresy. He fled to Germany, where his education as a reformer was completed by an intimate acquaintance with Luther and Melanchthon. After six months' absence he returned to Scotland and began to preach in the neighborhood of Linlithgow, but was allured by Beaton to St. Andrews under pretense of a friendly conference, put on his trial, convicted of various heresies, and burned at the stake, Feb. 29, 1528. His death did perhaps more to extend the principles of the Reformation in Scotland than even his life could have done.

Hamilton, Schuyler, an American soldier; born in 1822; a grandson of Alexander Hamilton; served in the Mexican and Civil Wars, and retired because of ill-health. He wrote "History of the National Flag of the United States." He died March 18, 1903.

Hamilton, Thomas, a Scotch novelist; born in 1789. He was educated at Glasgow University. After showing an incapacity for business he obtained a commission in the 29th Regiment. Retiring from the service about 1818, he soon became known as contributor to Blackwood's. His novel, "Cyril Thornton," published in 1827, reached several editions. "Annals of the Peninsular Campaign" came out in 1829; "Men and Manners in America" in 1833. He died in Pisa, Italy, Dec. 7, 1842.

Hamilton, William, a Scotch poet; born probably in Bangour, near Uphall, Linlithgowshire, Scotland, in 1704. He contributed to Ramsay's "Tea-table Miscellany" (1724), and joined in the second Jacobite rising. On its collapse he escaped to France, but was permitted to return in 1749 and to succeed to the family estate the year after. The first collection of his

poems was issued, without his consent, by Foulis, of Glasgow, in 1748; a fuller collection, with a portrait, appeared under the care of his friends in 1760. One of his poems alone, "The Braes of Yarrow," will keep his name from ever being forgotten, by the depth and truth of its unsought pathos. He died in Lyons, March 25, 1754.

Hamilton, Sir William, a British diplomat and archæologist, grandson of the third Duke of Hamilton; born Dec. 13, 1730. He was British ambassador at the court of Naples 1764–1800, and in 1772 was made a knight of the Bath. During his residence in Italy he took an active part in the excavation of Herculaneum and Pompeii, and formed a rare collection of antiquities, which was afterward purchased for the British Museum. He wrote: "Etruscan, Greek, and Roman Antiquities" (1766–1767); "Observations on Mount Vesuvius" (1772); "Campi Phlegræi" etc. (1776–1777). He died in London, England, April 6, 1803. See HAMILTON, LADY EMMA.

Hamilton, Sir William, a distinguished Scotch metaphysician; born in Glasgow, Scotland, March 8, 1788. His father and grandfather held in succession the chairs of anatomy and botany in Glasgow University. Having studied with distinction at Glasgow, in 1809 he entered Baliol College, Oxford, where he gained first-class honors. In 1813 he was admitted to the Scottish bar, but never acquired a practice in his profession, his taste lying much more toward the study of philosophy. In 1820 he became a candidate for the chair of moral philosophy in Edinburgh, rendered vacant by the death of Thomas Brown, but being defeated by Prof. John Wilson, he was obliged to content himself with the unimportant chair of universal history. In 1829 the publication in the "Edinburgh Review" of his celebrated critique of Cousin's system of philosophy gave him at once a first place among the philosophical writers of the time. This was followed in 1830 by his criticism of Brown, and in 1831 by his article on the authorship of "Letters of Obscure Men." In 1836 he was appointed to the chair of logic and metaphysics in Edinburgh University. In 1846 he published an annotated edition of the works of Thomas Reid, and in 1854 the first volume of a similar edition of the works of Dugald Stewart. His lectures on logic and metaphysics were collected and edited by Dean Mansel and Professor Veitch. Hamilton's most important contributions to philosophy are connected with his doctrine of the Quantification of the Predicate in his system of logic; his theory of the "relativity of knowledge," in the Kantian sense, held along with an apparently incompatible doctrine of immediate perception of the non-ego; and his definition of the infinite or unconditioned as a mere negation of thought. He died in Edinburgh, Scotland, May 6, 1856.

Hamilton, William Gerard, an English politician; born in London, England, Jan. 28, 1729. He earned the epithet of "single-speech Hamilton" by a speech made in the House of Commons, Nov. 13, 1754, as M. P. for Petersfield in Hants — nearly the only speech he ever made in the House. For 20 years he was Chancellor of the Irish Exchequer, and was by some regarded as the author of the letters of JUNIUS (*q. v.*). He died in London, England, July 16, 1796.

Hamilton, Sir William Rowan, an English mathematician and astronomer; born in Dublin, Ireland, Aug. 3–4, 1805. Before he had completed his 14th year he had made himself acquainted with 13 languages, among which were Arabic, Persian, Hindustani, Sanskrit, and Syriac. At the age of 17 he was pronounced by a competent authority the first mathematician of his age. At Trinity College, Dublin, he gained the highest honors, and he was appointed in 1827 Professor of Astronomy in Trinity College, as well as Astronomer Royal. He was knighted in 1835, and elected in 1837 president of the Royal Irish Academy. His fame is chiefly founded on his invention of the calculus of quaternions, a new method in the higher mathematics. Among his published works are "General Method in Dynamics," "Algebra as the Science of Pure Time," "Memoirs on Discontinuous Functions." He died Sept. 2, 1865.

Hamilton, William Tiffany, an American legislator; born in Hagerstown, Md., Sept. 8, 1820; was graduated at Jefferson College; was admitted to the bar in 1843; and three years later was elected by the Democrats to the House of Delegates. In 1849 he was elected to Congress and served three terms, but in 1855 was defeated. During the Civil War he took no active interest in political affairs, but after the adoption of the Constitution of 1867 ran for governor against Oden Bowie, and was beaten by a majority of one. In 1868 he succeeded William Pinckney Whyte in the United States Senate, and in 1875 was again a candidate for governor, but was defeated by John Lee Carroll. He ran once more in 1879, and was elected for the term 1880–1884. He died in 1888.

Hamilton College, an educational nonsectarian institution in Clinton, N. Y., founded in 1812; has grounds and buildings valued at over $500,000; endowment, $750,000; volumes in the library, 50,000; fellowships, 2; scholarships, 80; ordinary income, about $55,000; average number of faculty, 20; average student attendance, about 185; number of graduates, over 4,000.

Hamlet, the hero of Shakespeare's greatest tragedy, but whether a figure originally historical, mythological, or partly both, still remains uncertain. The legend of Amleth is first found in the 3rd and 4th books of the Latin history of Denmark by Saxo Grammaticus, written about the end of the 12th century, but first printed at Paris in 1514. The story of Hamlet was freely translated in the fifth volume of François de Belleforest's "Tragic Histories" (1570), and a rough but literal English translation of this exists in a single copy (once Edward Capell's) in the library of Trinity College, Cambridge, entitled "The Hystorie of Hamblet" (London, 1608; reprinted in Collier's "Shakespeare Library," 1841). Dr. Latham in his "Dissertations on Hamlet" (1872) contends that the hero in Savon's 3rd book is a different personage from that in the 4th, the former being identical with Olaf Kyrre, the Anlaf Cwiran of the "Saxon Chronicle," and the Amlaf Cuaran of the "Irish Annals"; the latter, with the Hygelac of Beowulf, and the Chocilaicus of Gregory of Tours. The inquiry into the mythological genesis of the story is more entertaining than profitable.

Hamley, Sir Edward Bruce, a British soldier and author; born in Bodmin, Cornwall, April 27, 1824; served in the Crimea; was commandant of the staff college in 1870–1877; did delimitation work on the Balkan and Armenian frontiers; and commanded the 2d Division at Tel-el-Kebir in 1882. In 1885–1892 he was Conservative member for Birkenhead. He wrote on the war in the Crimea (3rd edition 1891); "Wellington's Career" (1860); "The Operations of War" (1866; 4th edition 1878); and "Voltaire" (1879); besides several clever novels and other works. He died Aug. 12, 1893.

Hamlin, Cyrus, an American missionary; born in Waterford, Me., Jan. 5, 1811; was graduated at Bowdoin College in 1834 and at Bangor Theological Seminary in 1837; went to Turkey in the following year. From 1860 to 1876 he was president of Robert College, which he had founded after a long conflict with the Turkish government. President Hamlin belonged to the group of American educators in the Levant whose influence did much in molding the character of modern Bulgarian leaders, and producing autonomy for Bulgaria. He returned to the United States and became a professor in the Theological Seminary in Bangor; was president of Middlebury College, Vt., in 1880–1885, when he removed to Lexington, Mass. Part of his works are in the Armenian language; those in English include "Among the Turks" (1877) and "My Life and Times" (1893). He died Aug. 8, 1900.

Hamlin, Hannibal, an American statesman; born in Paris, Me., Aug. 27, 1809; was admitted to the bar in 1833; and began practice in Hampden; was elected to the United States Senate in 1848 to fill an unexpired term; reëlected in 1851 and again in 1857; resigned in 1861, after being elected Vice-President on the ticket with Abraham Lincoln; was again a United States Senator in 1869–1881, and then accepted the post of minister to Spain, but in the following year resigned and returned to the United States. He died in Bangor, Me., July 4, 1891.

Hamline University, a coeducational institution in St. Paul, Minn.; founded in 1854 under the auspices of the Methodist Episcopal Church; with liberal arts department at St. Paul and medical at Minneapolis; has grounds and buildings valued at $200,000; endowment, over $425,000; volumes in the library, 11,000; average faculty, 16; students, 385; graduates, over 600.

Hammer, a tool used for applying the force of impact, either for the purpose of beating malleable materials into a required form, or for driving nails, wedges, etc. The common hand hammer consists of an iron head, usually faced with steel, fixed crosswise on a wooden handle. When one side of the head is thinned out to a wedge form or to a point this is called the "pane" of the hammer. The "face" is the flat disk which strikes the work. Carpenters' and joiners' hammers have a bent pane with a V-shaped notch, which is used as a bent lever for drawing nails, etc. The pane is sometimes sharpened so as to form an adze or chisel. There are also many other modifications in the form of hammers.

A great variety of power-hammers are used. These, for the most part, are masses of iron raised by steam or other power, and then allowed to fall by their own gravity on the work. The "helve" or "shingling" hammer, used for compressing the mass of iron drawn from the puddling-furnace, and the "tilt" hammer, used in the manufacture of shear-steel, are important examples of such hammers. The first is a heavy bar of cast iron about 10 feet long, weighing 3 or 4 tons or more, to which is attached a head of wrought iron faced with steel, weighing nearly half a ton additional. It works on an axis at the end of the bar furthest from the head, and is raised by cams attached to a heavy wheel set in motion by steam or water power. These cams strike or "lick" a projection extending beyond the head, and thus raise it about 18 or 20 inches at the rate of 70 to 100 times per minute. The tilt hammer is similar, but much lighter, and is adapted for striking more than 300 blows per minute. In order to obtain this velocity a short "tail" extends with a downward inclination beyond the axis, and the cams strike this downward, and thus lift the longer arm of the lever to which the head is attached.

These, when worked by steam, as they are usually, are, of course, steam hammers; but when the term steam hammer is used without qualification it applies to a more elaborate machine of very different construction, invented by James Nasmyth 1842, and subsequently improved in minor details. In this the hammer is attached to the bottom of a heavy mass of iron, the "hammer-block," capable of rising and falling between upright bars or "guides"; this, again, is fixed to the rod of a piston, which works in a cylinder placed perpendicularly over the hammer-block, hammer, and anvil. As the piston rises in the cylinder it lifts the attached mass, which is then allowed to fall from varying heights, according to an adjustment which can be made by an attendant simply touching a handle. The adjustments are so perfect that it may be made to crush a mass of iron, and at the next blow to crack a nut held in the fingers without damaging either kernel or fingers, or to crack the top of an egg in an egg-cup as might be done with the bowl of a spoon. The "latch," which reverses the action of the steam valves at the precise moment required, is of remarkable ingenuity.

Hammer, Julius (häm'mer), a German poet and prose-writer; born in Dresden, June 7, 1810. His comedy called "The Strange Breakfast" (1834) was followed by a volume of charming lyric poetry under the title "Look About You, Look Within You" (1851); and by "Learn, Live, Love," and other successful efforts. His novels show talent; but his reputation must rest on his verse, which is graceful, unhackneyed, and ingenious. He died in Pillnitz, Aug. 23, 1862.

Hammerbeam, a beam in Gothic architecture which projects from the wall and forms a sort of bracket-support for the tie beams of an ornamental roof. Hammerbeams never extend across an apartment; and their ends are commonly decorated with carvings, very frequently representing emblazoned shields. They are often used also in the principals of Gothic roofs to strengthen the framing and to diminish the lateral pressure that falls upon the walls. The hammerbeam is generally supported by a rib rising up from a corbel below, and in its turn forms the support of another rib, which, with that springing from the hammerbeam on the opposite side, constitutes an arch. Hammerbeam roof a roof the feet of the principal rafters of which are connected by a tie beam, but usually rest in corbels. Half-rafters, carrying a vaulted superstructure, usually span the severy.

Hammerfest (häm'mer-fest), the extreme N. town of Europe; in lat. 70° 40′ N. and lon. 23° 30′ E., on the island of Kvalö, in the Norwegian province of Finmark. It is the rendezvous of the fishing fleets of the Kara sea and the waters along the Spitzbergen coasts. It imports coal, salt, hemp, flour, etc., in exchange for fish and fish-oil, with some reindeer hides, eider-down, and fox-skins. During the two summer months the sun is continually above the horizon. The winter is mild enough to allow of the fisheries being carried on. The town was burnt July 21, 1890.

Hammerhead Shark, a genus of preying fishes, with heads projecting laterally up and down, somewhat resembling a double-headed hammer, with an eye at each end of the head. They belong to the genus *Sphyrna;* abound in warm seas; and are very voracious and remarkably prolific.

Hammerich, Peter Frederik Adolf (häm'mer-ich), a Danish poet; born in Copenhagen in 1809. During the Danish-German War he was an army chaplain; and after it he was elected to Parliament, and began to write history. As a poet his "Hero Songs" deserve special mention. He died in Copenhagen, Feb. 9, 1877.

Hammer-Purgstall, Joseph Freiherr von, (häm'mer-pörg'stäl), an Austrian Orientalist; born in Gratz, Styria, June 9, 1774. He was educated at the Oriental Academy, Vienna, and when still a very young man took a share in the preparation of Meninsky's "Arabic, Persian, and Turkish Lexicon." In 1799 he accompanied as interpreter to Constantinople the internuncio Freiherr von Herbert, who afterward intrusted him with a mission to Egypt, where he collected various antiquities and manuscripts for the Imperial Library. He also accompanied, as interpreter and secretary, Sir Sidney Smith and Yussuf-Pasha in the campaign against General Menou. In 1810, on the occasion of the marriage of Napoleon with Maria Louisa of Austria, he accompanied the latter to Paris, where he became intimate with Sylvestre de Sacy and other Orientalists. In 1817 he was appointed imperial councillor at the court of Austria, where he also held the post of interpreter. On succeeding to the estates of the Countess of Purgstall in 1835 he received the title of *Freiherr* (Baron). He wrote: "Constitution and Administration of the Ottoman Empire"; "Constantinople and the Bosporus"; "History of the Ottoman Empire"; "History of Turkish Poetry"; "History of Arabic Literature"; etc. He died in Vienna, Nov. 23, 1856.

Hammond, a city in Lake co., Ind.; on the Grand Calumet river, and on the Pennsylvania, the Michigan Central, the Lake Shore, the Baltimore and Ohio, and several other important railroads; 18 miles S. E. of Chicago, Ill. It has numerous railway supply shops, foundries, tanneries, starch works, nail mills, packing houses, etc. There are electric lights, and street rail-

ways, public high school, a national bank, daily and weekly newspapers, and an assessed property valuation of $5,000,000. Pop. (1900) 12,376; (1910) 20,925.

Hammond, Edward Payson, an American evangelist; born in Ellington, Conn., Sept. 1, 1831; was graduated at Williams College in 1858; studied theology at Union Seminary, N. Y., and Free Church Seminary, Scotland; and was ordained by the Presbytery of New York in 1862. For years he was prominent as an evangelist in Great Britain and the United States. He wrote "Children and Jesus," "Jesus the Way," "Golden Gleanings," "Early Conversion," etc. He died Aug. 14, 1910.

Hammond, Mrs. Henrietta (Hardy), pseudonym HENRI DANGÉ, an American novelist; born in Virginia, in 1854. She wrote: "The Georgians"; "A Fair Philosopher"; "Her Waiting Heart"; "Woman's Secrets, or How to be Beautiful"; etc. She died in 1883.

Hammond, William Alexander, an American surgeon; born in Annapolis, Md., Aug. 28, 1828; was graduated at the University of the City of New York in 1848; joined the United States army in 1849 as assistant surgeon; became surgeon-general in April, 1862; was found guilty of misdemeanor by court-martial and discharged from the army in 1864; practised in New York till 1878, when the proceedings of the court-martial were reviewed and he was restored to his former rank in the army and retired. His publications include "Military Hygiene"; "Sleep and Its Derangements"; "Nervous Derangements"; "Diseases of the Nervous System"; "Neurological Contributions"; etc.; also several novels, including "Robert Severne"; "A Strong-Minded Woman"; "A Son of Perdition"; etc. He died in Washington, D. C., Jan. 5, 1900.

Hampden, John, a celebrated English statesman; born in London, England, in 1594. He was cousin-german by the mother's side to Oliver Cromwell. In 1609 he was entered a gentleman commoner at Magdalen College, Oxford. He began the study of law in the Inner Temple, but having inherited an ample fortune on his father's death he lived the usual life of a country gentleman. He entered Parliament in the beginning of Charles I.'s reign as member for Grampound, and continued to sit in the House of Commons three times in succession as member for Wendover, and finally as member for Bucks. Though for some years a uniform opposer of the arbitrary practices in Church and state, it was not till 1636 that his resistance to Charles's demand for ship-money, made him the argument of all tongues. Though the decision in the Court of Exchequer was given against him by seven voices to five, the victory, as far as regarded public opinion, was his. In the following year (1637) he was one of those who meditated emigration to America, which they were prevented from carrying out by an order in council detaining them. Henceforward he took a prominent part in the great contest between the crown and the Parliament, was a strong supporter of the Grand Remonstrance, and was one of the five members whom the king, in 1642, so imprudently attempted, in person, to seize in the House of Commons. When the appeal was made to the sword, Hampden accepted the command of a regiment in the parliamentary army under the Earl of Essex. He also became a member of the Committee of Public Safety. He was a capable soldier, and, in opposition to Essex's policy of compromise, urged a vigorous campaign. In a skirmish at Chalgrove Field, June 18, 1643, he received a wound which proved fatal on June 24. See also COMMONWEALTH; ENGLAND—*History;* REMONSTRANCE, THE GRAND.

Hampden, Renn Dickson, an English clergyman and theologian; born in Barbadoes in 1793. He studied at Oriel College, Oxford, taking a double first in 1813, and becoming in due course Fellow and tutor of his college. In 1832 his famous Bampton lectures on the "Scholastic Philosophy considered in its Relation to Christian Theology" were by great part of the Church considered grievously heretical, and raised a controversy that threatened to break up the Church of England. His successive appointments to the principalship of St. Mary's Hall (1833), the chairs of Moral Philosophy (1834) and of Divinity (1836), were denounced successively by the strong party led by Wilberforce, and his elevation to the see of Hereford in 1847 was by it regarded as a death-blow to Trinitarian religion. Yet Bishop Hampden's works may now be regarded as innocent and edifying. He wrote: "Work of Christ and the Spirit" (1847); "Lectures on Moral Philosophy" (1856); and "Fathers of Greek Philosophy" (1862). After an episcopate of studious quiet he died in London, April 23, 1868.

Hampden-Sidney College, an institution of learning in Hampden-Sidney, Va.; founded in 1775 by the Presbyterian Church of Hanover and incorporated by the Legislature of Virginia in 1783. It is located on a tract of land given by Peter Johnson in 1773, and which has since been largely increased by purchases and gifts. The college has grounds and buildings valued at over $200,000; endowment, about $170,000; volumes in the library, 17,000; scholarships, 55; ordinary income, about $17,000; average number of faculty, 9; average student attendance, 150.

Hampstead, a parliamentary borough of Middlesex, England, situated on a range of hills 4 miles N. W. of London. It was formerly famous for its medicinal springs, and is still a favorite place of residence and of holiday resort among Londoners, who are attracted to it by the beauty of its situation and the purity of its air. On the summit of the hill (430 feet), above the village, is the Heath, which affords extensive and pleasant prospects of the surrounding country. A house on the Heath, formerly called the Upper Flask Inn, and now a private residence, was at one time the place of resort of the famous Kit-Cat Club, at which Steele, Addison, Richardson, Walpole, and others used to assemble. Hampstead is associated with many names in literature and art, as those of Pope, Gay, Johnson, Akenside, Joanna Baillie, Byron, Constable, Romney, Coleridge, Keats, Shelley, Leigh Hunt, and Landseer. Pop. (1901) 81,902.

Hampton, a town and county-seat of Elizabeth City co., Va., on the James river, and on the Chesapeake and Ohio railroad; 15 miles N. W. of Norfolk It is the seat of the Hampton Normal and Agricultural Institute for Indians and Negroes, and a National Soldiers' Home. It is a fashionable resort, having a good bathing ground at Old Point Comfort, and being within 2 miles of Fortress Monroe. It carries on considerable trade in fish and oysters, and manufactures brick and fish oil. The town has weekly newspapers, a State bank and an assessed property valuation of $700,000. Pop. (1900) 3,441; (1910) 5,505.

Hampton, a village of Middlesex, England, on the Thames, 15 miles S. W. of London. In the vicinity are many fine mansions and beautiful villas, including Garrick's villa.

Hampton Court Conference, a conference which took place at Hampton Court shortly after the accession of James I. to the throne of England, in order to the settlement of ecclesiastical disputes. Archbishop Whitgift, with eight bishops, six deans, and an archdeacon, appeared on the High Church side; two Oxford professors of divinity, two divines from Cambridge, and along with them Patrick Galloway, minister of Perth, maintained the Puritan cause. On the king's accession the Puritans, entertaining great hopes of release from the rigid enforcement of ceremonies which galled their consciences, and of the reformation of abuses in the Church, had addressed a petition to the king, known as the "Millenary Petition," because it was signed by nearly 1,000 ministers in all parts of the country. But the king's intention was not to comply with their wishes, and the Hampton Court Conference seems to have been merely a device for making it appear that their demands had been considered and found unreasonable. On the first day of the conference, Jan. 12, 1604, the High Church representatives alone were admitted to the presence of the king, who demanded their opinion, which they gave on the third day after, in favor of the existing system in all the parts complained of. On Jan. 16 the Puritans were called to the king's presence, but along with them some of their opponents, when James debated keenly against the Puritans, and, according to his own account of the matter, "peppered them soundly." On Jan. 18 both parties were called in, and the royal judgment intimated, which was afterward announced in a proclamation very adverse to the Puritans.

Hampton Court Palace, long a royal residence, and now partially occupied by persons of good family in reduced circumstances, standing about a mile from the village of Hampton, England, in the midst of grounds that extend to the Thames. The original palace was erected by Cardinal Wolsey, and by him presented (1526) to Henry VIII., who enlarged it and formed around it a royal deer park. Here Edward VI. was born, his mother, Queen Jane Seymour, died, and Charles I. underwent a portion of his confinement. Here, too, was held the famous HAMPTON COURT CONFERENCE (*q. v.*). It continued to be a royal residence down to the time of George II. A considerable portion of it was rebuilt by William III., from designs by Wren, and he also laid out the park and gardens in the formal Dutch style. The picture gallery contains several Italian works, Lely's Beauties of the Court of Charles II., and valuable specimens of Holbein, Kneller, West, etc. The cartoons by Raphael have been removed to the South Kensington Museum. The gardens present a series of raised terraces, formal flower-pots, and long and shady arcades, and have among other attractions a "maze" or labyrinth. Damage, estimated at $100,000, was caused by fire in November, 1886.

Hampton, Wade, an American military officer; born in South Carolina in 1754; fought in the Revolutionary War under Sumter and Marion; was a member of Congress, 1795–1797 and 1803–1805. He was commissioned colonel in the United States army in 1808; promoted Brigadier-General in 1809, and Major-General in 1813; served in the War of 1812; and resigned his commission in April, 1814. He died in Columbia, S. C., Feb. 4, 1835.

Hampton, Wade, an American military officer; born in Charleston, S. C., March 28, 1818; grandson of WADE HAMPTON (*q. v.*); was graduated at South Carolina College. At the outbreak of the Civil War he was

believed to be one of the richest of Southern planters and owned the greatest number of slaves. He entered the Confederate army; raised and in part equipped the Hampton Legion, and was chosen its commandant; was wounded in the first action at Bull Run and also at Gettysburg. He was promoted Major-General May 11, 1864, and in August of the same year appointed

WADE HAMPTON.

commander-in-chief of the Confederate cavalry in Northern Virginia; was promoted Lieutenant-General in 1865. He greatly distinguished himself in several important actions, including the defeat of Sheridan's cavalry at Trevillian, Va.; the capture of about 2,500 head of cattle from General Grant's commissariat; etc. After the conclusion of peace he was a stanch advocate of conciliation between the North and South; was elected governor of South Carolina in 1876 and 1878; held a seat in the United States Senate in 1878–1890; and was appointed Commissioner of Railroads in 1893. He died April 11, 1902.

Hampton Normal and Agricultural Institute, a school for Indians and negroes opened in 1868 in Hampton, Va., by the American Missionary Association. In 1870 the school received a charter from the General Assembly of Virginia, creating a corporation, giving power to the trustees to choose their own successors and to hold property without taxation to the amount of $800,000. In 1875 the General Assembly of Virginia passed an act giving the institute one-third of the agricultural college land-grant of Virginia, amounting to 100,000 acres, which was sold for $95,000, and pays regular annual interest. The farm land, and the workshops where trades are taught, furnish occupation for the boys, while the girls are similarly instructed and employed in sewing and cooking classes, doing all the domestic duties of the school, and wherever possible learning trades side by side with the boys. The students are charged $10 a month for board, which is paid largely in labor. The remainder, with their clothing and books, they are expected to provide, while for the cost of tuition, buildings, furniture, implements, etc., the school is dependent on the charity of the country. In 1878, 15 Indians, who had been in charge of Capt. R. H. Pratt, at St. Augustine, Fla., as prisoners of war, were admitted as students, and from this beginning the Indian Department has increased, the Indian pupils being chiefly from the Sioux tribe, of whom two-thirds make a fair or good record. The institute offers about 20 courses, including agriculture, civil, mechanical, electrical, and mining engineering, architecture, domestic economy, nursing, carpentry, and military tactics. It has permanent funds of about $2,000,000; grounds and buildings valued at over $775,000; property of all kinds exceeding $3,000,000; volumes in the library, 25,000; ordinary income, about $250,000; average faculty, 96; average students, 1,400; graduates, over 1,500. See ARMSTRONG, SAMUEL C.

Hampton Roads, a broad, deep arm of Chesapeake Bay at the mouth of James river, between Hampton and Norfolk, Va.; with Newport News, Old Point Comfort, Fort Monroe, Fort Wool, and Thimble Shoal Lighthouse at or near the entrance to the bay. Since the Civil War the locality has become popular as a summer and winter resort and as a stopping place for Northern invalids on their way to and from Florida. Its attractions include the beach, bathing places, and promenades of Old Point Comfort, the famous Fort Monroe, the old village of Hampton, National Home for Disabled Soldiers and Sailors, United States National Cemetery, and unsurpassed facilities for short excursions, fishing and yachting. In 1861 the Confederates seized the United States frigate "Merrimac" at Norfolk, covered her hull with railroad iron, and under the name of "The Virginia" sent her to attack the United States vessels lying in Hampton Roads in 1862. She rammed the frigate "Cumberland," which sank in 45 minutes; forced the "Congress" on the Shoal, where she was disabled, set on fire, and blown up, but was prevented by her draught from getting within striking distance of the "Minnesota." On the following morning she reappeared to attack the "Minnesota," but was suddenly confronted by the new Union iron-clad "Monitor," just arrived from New York, which fought her so effectually that she withdrew from the fight, steamed up the river, and refused to come out a second time to meet the "floating Yankee cheese-box."

Hampton Roads Conference, in the history of the United States. an informal

consultation held on shipboard near Fort Monroe, Va., Feb. 3, 1865, with regard to the conclusion of peace between the Federal government and the Confederacy. The representatives of the United States were President Lincoln and Seward, Secretary of State; of the Confederate States, Vice-President Stephens, Campbell, Assistant-Secretary of War, and Senator R. M. T. Hunter. Lincoln refused all terms that did not provide for full re-establishment of the Union, and declined to treat with the Confederacy as such. No basis of agreement was secured.

Hamstring. At the back of the knee-joint the tendon of the biceps muscle forms the outer hamstring, and the sartorius (tailor's muscle), with the tendons of the gracilis, semi-tendinosus, and semi-membranosus, the inner hamstring, with the two heads of the gastrocnemius muscle between. The hamstring muscles extend the hip and flex the knee.

Han, a Chinese dynasty, reigning from 20 B. C. to A. D. 25.

Hananiah (-nī'ä), a false prophet of Gibeon, who for his impious hardihood was overtaken with speedy death, according to the word of God (Jer. xxviii: 15–17).

Hanaper, in ordinary language, a large basket; a hamper. In English law, a kind of basket formerly used by the sovereigns of England in which to hold and carry their treasury while traveling from place to place; the royal treasury. The Clerk of the Hanaper received all moneys due to the crown for sealing charters, patents, commissions, and writs. He was in daily attendance on the Lord Chancellor or the Lord Keeper in term time and at all times of sealing, having with him leathern bags, into which he put all charters as they were sealed. There was also a Comptroller of the Hanaper, whose duty it was to see that the fees were duly paid into the hanaper.

Hanaford, Phebe Ann (Coffin), an American Universalist minister; born in Nantucket, Mass., May 6, 1829. She was the first of her sex to become a member of the Universalist clergy. In 1887 she was called to a church in New Haven, Conn. Her works are: "Life of Abraham Lincoln"; "Life of George Peabody"; "Lucretia the Quakeress"; "Leonette, or Truth Sought and Found"; "The Best of Books and its History"; "Frank Nelson, the Runaway Boy"; "The Soldier's Daughter"; "Field, Gunboat, and Hospital"; "Women of the Century"; "From Shore to Shore, and Other Poems"; etc.

Hanau (hä'nou), a town in the Prussian province of Hesse-Nassau; at the confluence of the Kinzig and the Main; 13 miles E. by N. of Frankfort. It is divided into the Old and the New Town; the latter was founded in 1597 by Protestant refugees from Holland and Belgium, who introduced the manufacture of woolen and silk goods, which still flourishes. The town of Hanau stands preëminent in Germany for its jewelry and gold and silver wares. Besides these it carries on manufactures of carpets, chocolate, leather, cards, paper, hats, tobacco, and gunpowder, and has breweries and an iron foundry. Here the brothers Grimm were born. In the neighborhood is the watering-place of Wilhelmsbad. Hanau dates as a town from 1393. It had a very chequered history during the Thirty Years' War. Near the town was fought one of Napoleon's last battles in Germany, Oct. 30 and 31, 1813, when he defeated the allied Austrians and Bavarians under Wrede.

Hanbalites, a Mohammedan sect; a branch of the Sunnites.

Hancock, John, an American revolutionary patriot and president of Congress; born in Quincy, Mass., Jan. 12, 1737. In the inception of the Revolutionary struggle he was a leading spirit. The attempt to arrest Hancock and Samuel Adams led to the battle of Lexington. Hancock was a member of the Continental Congress from 1775 to 1780, also from 1785 to 1786, serving as president of the body from 1775 to 1777. The Declaration of Independence as first published bore only his name. He served as governor of Massachusetts 12 years. As an orator he was eloquent; as a presiding officer, dignified and impartial. He died in Quincy, Mass., Oct. 8, 1793.

Hancock, Winfield Scott, an American military officer; born in Montgomery Square, Montgomery co., Pa., Feb. 14, 1824; was graduated at the United States Military Academy in 1844, and received his commission of 2d lieutenant; served during the Mexican war, was promoted for gallantry, and, having filled several subordinate posts, made assistant quartermaster-general; in 1861 was appointed a Brigadier-General of volunteers, and attached to the Army of the Potomac, accompanied General McClellan to the peninsula in 1862, and distinguished himself before Yorktown and Williamsburg; at the battle of Fredericksburg, in December, 1862, commanded a division of the 2d Corps, which suffered most severely, and for his services on this occasion received his commission as Major-General; took part in the battles of Chancellorsville and Gettysburg in 1863, and in one of the many struggles of that campaign was severely wounded; in 1868, was appointed by President Johnson to the command of the S. W. military district, but his appointment was not indorsed by the Senate. In June, 1880, he became the unsuc-

cessful Democratic nominee for President. He died in New York city, Feb. 9, 1886.

Hancornia (-kor'-), a genus of *Apocynaceæ*, tribe *Carisseæ*. *H. pubescens* is a tree with a viscid, milky juice, pendulous branches, fragrant flowers, and a delicious fruit about as large as a plum. It grows in Brazil.

Hand, the part of the body which terminates the arm, consisting of the palm and fingers, connected with the arm at the wrist; the principal organ of touch and prehension. The human hand is composed of 27 bones, namely eight bones of the carpus or wrist arranged in two rows of four each, the row next the fore-arm containing the scaphoid, the semilunar, the cuneiform, and the pisiform, and that next the metacarpus, the trapezium, the trapezoid, the os magnum, and the unciform. The metacarpus consists of the five bones which form the palm, the first being that of the thumb, the others that of the fingers in succession. Lastly, the fingers proper contain 14 bones called phalanges, of which the thumb has but two, all the other digits having three each. These bones are jointed so as to admit of a variety of movements, the more peculiar being those by which the hand is flexed backward, forward, and sideways, and by which the thumb and fingers are moved in different ways.

The chief muscles which determine these movements are the "flexors," which pass down the fore-arm, are attached by tendons to the phalanges of the fingers, and serve to flex or bend the fingers; and the "extensors" for extending the fingers. There are two muscles which flex all the fingers except the thumb. The thumb has a separate long and short flexor. There is a common extensor for the fingers which passes down the back of the fore-arm and divides at the wrist into four tendons, one for each finger, each being attached to all three phalanges. The fore-finger and little finger have, in addition, each an extensor of its own, and the thumb has both a short and a long extensor. The tendons of the muscles of the hand are interlaced and bound together by bands and aponeurotic fibers, and from this results a more or less complete unity of action. It is sometimes difficult to make a movement with a single finger without the others taking part in it, as in executing instrumental music, for instance; but practice gives to these movements perfect independence.

Of all the movements of the hand the opposition of the thumb to the other fingers, alone or united, especially characterizes the human hand. This action of the thumb results from its length, from the first metacarpal bone not being placed on the same plane as the other four, as is the case in the monkey, and from the action of a muscle — the long flexor of the thumb — peculiar to the human hand. This muscle completes the action of the other motor of the thumb, and permits man to hold a pen, a graver, or a needle; it gives to his hand the dexterity necessary in the execution of the most delicate work. Properly speaking then, the hand, with its highly specialized muscles, belongs to man alone. It cannot be considered, as in the ape, as a normal organ of locomotion. It is essentially the organ of touch and prehension. It molds itself to a body to ascertain its form; it comes to the aid of the eye in completing or rectifying its impressions. The functions of touch devolve principally on its anterior or palmar face, the nervous papillæ abounding specially at the ends of the fingers. A layer of adipose tissue very close in texture protects, without lessening its power or its delicacy, the network of muscles, vessels, and nerves with which this remarkable organ is equipped. See PALMISTRY.

Handball, a game of ball, played without any instrument for striking, the bare hand only being used. The game is indigenous to Ireland, but has been transplanted to America, where are the most expert players. Two or four men can play, one or two on a side. As far as is known the game of handball came to the United States about 1840,

Following are the rules of the game:

A game of handball shall consist of 21 aces, to be played with a ball about 2 inches in diameter and 1 1-3 ounces in weight.

A game to be played by two persons shall be called a single hand game; by four persons a double game.

When a match is made, be it double or single, the players shall toss for the first hand, the winner to have one hand only in the first inning.

The winner of the toss shall stand inside of a line called the ace line (which is supposed to be in the center of the court), bound the ball on the floor, striking it with his hand against the front wall. He shall serve it to the player or players beyond the ace line.

In scoring the game each player shall be credited with an ace according as it may be scored by "service" or "return."

The striker failing to strike the ball over the ace line three times in succession is a hand out.

If the striker, when serving the ball, strikes either side wall before striking the front wall, it is a hand out.

If the striker or his partner stops the ball intentionally before it bounds after leaving the front wall, it is a hand out.

If the striker or his partner stops the ball intentionally while on its way to the front wall, it is a hand out.

If a ball struck by the player strikes the striker or his partner, it is a hinder, and it shall be played over again.

When a ball is served short to the player he has the privilege of striking it with his hand or foot; if struck with the foot and it fails to go upon the front wall, it does not score. If struck with the hand and it fails to strike the front wall, it is an ace for the striker.

A ball being served short to the player and he strikes it with his foot on the front wall, the striker, after returning it on the wall, has the privilege of preventing the player from striking it again.

If a ball is struck with the foot and assisted by the hand on to the front wall, it is foul.

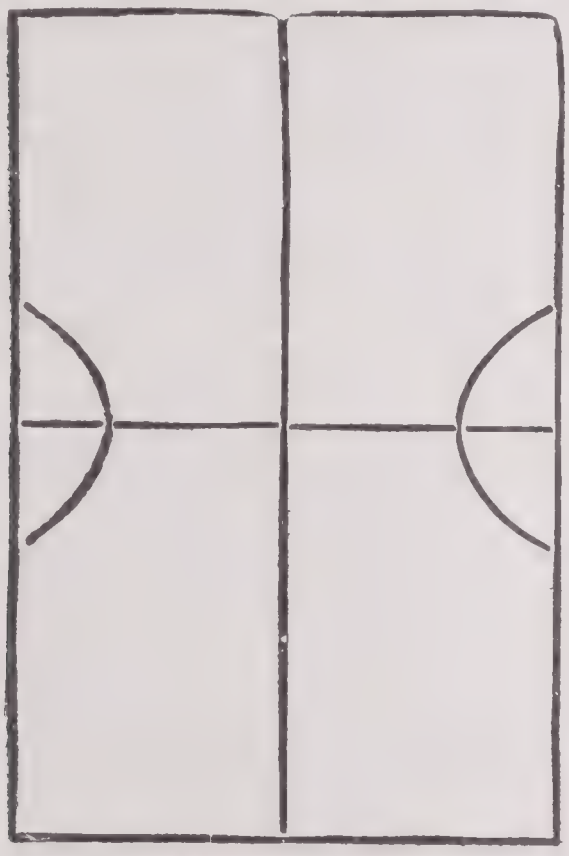
When the player is about to strike the ball and his opponent jostles him or gets in his way intentionally, it is an ace or a hand out.

When a ball is served to the player he shall strike it on the fly or first bound; failing to do so counts an ace for the striker.

In a match for a prize the contestants are allowed one minute for refreshment at the expiration of each game before commencing another. The one failing to respond to the call of time loses the match.

In a double match the striker's partner shall stand with his back against either side wall inside of the ace line, till the ball leaves the front wall; failing to do so is foul.

If a ball served to the player goes over the back



HANDBALL COURT.

board or strikes the gallery before bounding, it is a foul.

The striker shall call time before serving the ball, and shall not serve the ball before the player or players are outside of the line.

In all cases when a ball is taken foul, and the players play it or not, it shall be decided as a foul ball.

In striking the ball the player shall not touch the ball with any part of his person other than the hand or foot, under forfeit of an ace or hand out.

If the striker in serving the ball strikes himself or his partner with the ball and it goes over the ace line, it is at the option of the player whether he plays to it or not, as it can be called a hinder.

In case there are only boundary lines drawn, and no side walls, if the ball after striking the front wall rebounds outside the side boundary line, such ball is foul, and is a hand out.

All disputed balls shall be decided by a referee chosen by the players, whose decision in all cases shall be final.

Handcuffs, an instrument formed of two iron rings connected by a short chain or fixed on a hinge on the ends of a very short iron bar, which, being locked over the wrists of a malefactor, prevents his using his hands.

Handel (han'del), properly **Haendel** (hen'del), **George Frederick,** a great German composer; born in Halle, Prussia, Feb. 23, 1685. The passion which he early showed for music overcame his father's opposition to training him as a musician, and at the age of 7 he was placed under the tuition of Zachau, organist of Halle Cathedral. In 1696 he was sent to Berlin, where he heard the music of Bononcini and Ariosti. He returned to Halle, was appointed organist of the cathedral in 1702, but soon left to visit Hanover and Hamburg, where Steffani and Reinhard Keiser, the latter the greatest German operatic composer of his day, resided. At Hamburg he played second violin in the orchestra, and brought out in 1704 his first work, an oratorio on the Passion, and his first opera, "Almira," followed in February by his "Nero," and subsequently by his "Florinda and Daphne." In 1706 he went to Italy, visiting Florence, Venice, Naples, and Rome. On his return to Germany he entered the service of the Elector of Hanover, afterward George I. of England, as musical director. He visited England twice, and ultimately having received a pension from Queen Anne, settled down there. For some years his popularity was very great. He was placed at the head of the newly-founded Royal Academy of Music, and accumulated a large fortune in spite of the heavy losses which he incurred by setting up an opera company in opposition to that supported by the leading nobility and the principal Italian singers. Among the operas which he had composed up to this date (1735) are "Rhadamistus," "Ottone," "Julius Cæsar," "Flavius," "Tamerlane," "Scipio," "Richard I.," "Orlando," "Ariadne," etc. His last opera was performed in 1740. By this time he had begun to devote himself chiefly to music of a serious nature, especially the oratorio. The approval which his first works of this kind, "Esther" (1731), "Deborah" (1732), "Athalia" (1733), had met with encouraged him to new efforts; and he produced in succession "Israel in Egypt," "L'Allegro and Il Pense roso" (Joy and Sadness), "Saul," and "The Messiah," (his chief work 1741). It was not much appreciated at the first representation, but increased in reputation every year. In 1742 the "Samson" appeared, in

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1746 the ' Judas Maccabæus," in 1748 the "Solomon," and in 1752 the "Jephthah." In 1752 he became blind, but did not lose his spirits, continuing to perform in public and even to compose. He died in London, April 13, 1759, and was buried in Westminster Abbey.

Handfasting, a custom at one time prevalent in Scotland, by which a man and a woman entered into conjugal relations on the strength simply of a verbal contract of marriage. Persons so handfasted were bound to each other for 12 months and a day, after which they could either separate or be formally united in marriage. The custom had its great evils in society, and the clergy, both of the pre-Reformation and the post-Reformation Churches, directed many injunctions against it. See MORGANATIC.

Handicap (for hand i(n) cap, for the drawing of lots out of a hat or cap), an old game at cards, not unlike loo, but with this difference: the winner of one trick had to put a double stake into the pool, the winner of two tricks a triple stake, and so on. In racing: (1) The allowance of time, distance, or weight made to the inferior competitors in a race with the object of bringing all as nearly as possible to an equality; the extra weight imposed on a superior horse in order to reduce his chance of winning to an equality with that of an inferior animal. The allowance of time or distance by a superior to an inferior performer is the system generally adopted in races between pedestrians, the imposition of extra weight that adopted in horse-racing. The handicap is framed in accordance with the known previous performances of the competitors, and in horse-racing also with regard to the sex and age of the animals engaged. The principle is the same in other contests, as in billiards a superior player is handicapped by having to allow his inferior competitor a start of a certain number of points. (2) A race or contest in which the competitors are brought as nearly as possible to an equality by the allowance of time, distance, etc., or the imposition of extra weight.

Hand Promise, a peculiarly solemn and unless by common consent, irrevocable form of betrothal, usual among the Irish peasantry. Whenever one of the parties to a hand promise dies without having been released or having released the other, the survivor, in presence of witnesses, grasps the hand of the deceased, repeating a special form of words recalling the promise.

Hands, Laying on of. This rite, as a token of blessing, or the communication of spiritual gifts, or of something else which could not be literally delivered into the hands of another, has been in use from the earliest times. It occurs in Scripture as a patriarchal usage, appropriate and becoming perhaps rather than strictly religious, but later assumes more of the character of a formal rite, as in the ritual of animal sacrifice among the Jews, when the officer was required to lay his hands on the victim while still alive, except in the case of the paschal lamb. In the early Church this rite was used in benediction, absolution, the unction of the sick, and the reconciliation of penitents as well as in ordination and confirmation. The rite is still retained by most Western Churches in the ceremony of ordination, and in the Roman Catholic, Anglican, and Lutheran Churches both in confirmation and ordination.

Hangchow-foo (-chou), the gate of the imperial canal, capital of the Chinese province of Chêhkiang, and since the Japanese treaty of Shimonoseki (1895), a treaty port, at the mouth of the Tsien-tang in the Bay of Hangchau, 110 miles S. W. of Shanghai. The city, one of the great commercial, religious, and literary centers of China, has clean, well-paved streets and many magnificent temples, is a principal seat of the silk manufacture, of gold and silver work, and is noted for the beauty of its surroundings. From a remote period many spots in the environs have been the resort of pilgrims; and here several thousands of candidates assemble every year for the public examinations. It was formerly a naval port. The river is subject to a dangerous bore or eager. Previous to the Tâiping rebellion, the city had about 2,000,000 inhabitants; but it was then (1861) laid in ruins by the rebels, and in 1905 contained a population estimated at 350,000.

Hanging. In cases of hanging, death seldom results from pure asphyxia, but is usually in some degree owing to apoplexy and injury to the spinal cord. In attempted suicide, bleeding from the jugular vein and artificial respiration may be tried for resuscitation. In difficulty of inducing artificial respiration, laryngotomy and tracheotomy should be performed, and the lungs inflated through the opening in the neck. In judicial hanging, the noose ought to be so adjusted as to produce immediate dislocation of the spinal column, death in that case being instantaneous. In law, hanging is the prescribed penalty of willful murder. In New York State electrocution is substituted for death by hanging. In Rhode Island, Michigan and Wisconsin infliction of the death penalty is forbidden by law. Hanging, drawing, and quartering were once the punishment of treason in England. In printing, the crooked appearance caused in a page of type by being locked up at the side before it is at the foot.

Hanging Gardens. The Hanging Gardens of Babylon were anciently reckoned

among the wonders of the world. Their construction is variously ascribed to Queen Semiramis and to Nebuchadnezzar. Diodorus and Strabo have given descriptions of them. They are said to have formed a square, with an area of nearly four acres, and rose in terraces, supported on masonry arches, to a height of 75 feet. They were irrigated from a reservoir built at the top, to which water was lifted from the Euphrates by a screw. Fountains and banqueting-rooms were distributed throughout the numerous terraces; groves and avenues of trees, as well as parterres of flowers, diversified the scene; while the view of the city and neighborhood was extensive and magnificent.

Han-hai (hän-hī′), an ancient dried-up sea in Central Asia, now represented only by Lake Lob-nor.

Han-kiang (hän-kyäng′), a river in China, 1,300 miles long. Traffic is considerable and the region watered is in some places styled the "Garden of China."

Hankow (-kou) ("Mouth of the Han"), a town and river-port in China, in the province of Hupeh, at the junction of the Han with the Yang-tse-kiang; Hanyang being on the opposite bank of the Han, and Wuchang on the other side of the Yang-tse. The port was opened to foreign trade in 1862, and has become the chief emporium for the green-tea districts in the central provinces, which formerly sent their produce for export to Canton. Large steamers ascend to the town. In 1857 Hankow fell into the hands of the Taiping rebels, and was almost completely demolished by them. Imports for 1898 amounted to 65,882 custom-house taels; exports to 3,868,250 custom-house taels. Pop. (1905) est. 870,000.

Hanli, a Tibetan altitude, one of the highest inhabited places on the globe; a noted cloister occupies the spot.

Hanna, Marcus Alonzo, an American legislator; born in New Lisbon (now Lisbon), Columbiana co., O., Sept. 24, 1837. He removed with his father's family to Cleveland in 1852; was educated in the common schools of that city and the Western Reserve College, Hudson, O.; was engaged as an employe in the wholesale grocery house of Hanna, Garretson & Co., his father being senior member of the firm. His father died in 1862 and he represented his interest in the firm till 1867, when the business was closed up; then became a member of the firm of Rhodes & Co., engaged in the iron and coal business; at the expiration of 10 years the title of this firm was changed to M. A. Hanna & Co., which still exists. He was identified with the lake-carrying business, being interested in vessels on the lakes and in the construction of such vessels; was a director in the Globe Ship Manufacturing Company of Cleveland; president of the Union National bank of Cleveland; president of the Cleveland City Railway Company; president of the Chapin Mining Company, Lake Superior; was government director of the Union Pacific Railway Company in 1885, by appointment of President Cleveland; a delegate to the National Republican Conventions of 1884, 1888 and 1896; elected chairman of the National Republican Committee in 1896; appointed to the United States Senate by Governor Bushnell, March 5, 1897, to fill vacancy caused by resignation of John Sherman, appointed Secretary of State in President McKinley's cabinet. In January, 1898, he was elected for the short term ending March 3, 1899 and for the full term ending March 3, 1905, and in January, 1904, for the succeeding term. **He died Feb. 15, 1904.**

Hanna, William, a Scotch theological writer; born in Belfast in 1808. He was educated at the University of Edinburgh, and was ordained in 1835 to the Lanarkshire parish of East Kilbride. He came out at the Disruption, and became in 1850 colleague to Dr. Guthrie in Free St. John's Church, Edinburgh. He resigned his church through ill-health in 1867. He edited for some years the "North British Review," and published many theological books, of which perhaps the best known is "Our Lord's Life on Earth" (1869). Well-known works are his "Memoirs of Dr. Chalmers," his father-in-law (4 vols. 1849–1852; a fifth, his correspondence, 1853), and "The Letters of Thomas Erskine of Linlathen" (1877–1878). He died in 1882.

Hannay, James, a British critic and novelist; born in Dumfries, Scotland, Feb. 17, 1827. A few years of boyhood were spent in the navy, from which he was dismissed at 18 by a court-martial sentence, afterward quashed as irregular. He early devoted himself to a life of letters, finding a favorite pastime in the study of genealogy, heraldry, the classics, and 18th-century English literature. For several years he edited the Edinburgh "Courant," and was afterward British consul at Barcelona. Of his novels the best are "Singleton Fontenoy" (1850) and "Eustace Conyers" (1855). His "Lectures on Satire and Satirists" (1854) and "Essays from the Quarterly Review" (1861) show wide knowledge and fine literary sense, often expressed in admirably terse and epigrammatic English. Other works were "Three Hundred Years of a Norman House"—the Gurney family (1866), and "Studies on Thackeray" (1869). He died in Barcelona, Spain, Jan. 3, 1873.

Hannibal

Hannibal, a city in Marion co., Mo., on the Mississippi river, here spanned by an iron railroad bridge, and on the St. Louis, Keokuk, and Northwestern, the Burlington and Wabash, the Missouri, Kansas, and Texas, and the St. Louis and Hannibal railroads; 110 miles N. W. of St. Louis. It has steamship communications with all important river ports, and manufactures lime, lumber, machinery, flour, planing mill products, foundry products and supplies, etc. The city has a public library, public high school, the Douglas Colored High School, electric lights, and street railways, daily and weekly newspapers. Pop. (1890) 12,857; (1900) 12,780; (1910) 18,341.

Hannibal, a Carthaginian general; son of Hamilcar Barca; born 247 B. C. At the age of 9 years his father, whom he was eager to accompany in the war against Spain, made him swear at the altar eternal hatred to the Romans. He was a witness of his father's achievements in Spain; but Hamilcar having fallen in battle in Lusitania in 229 B. C., and his son-in-law Hasdrubal having been appointed to succeed him, Hannibal returned home. At the age of 22 he returned to the army at the request of Hasdrubal. The soldiers perceived in him the spirit of Hamilcar, whom they had so highly esteemed; and in three campaigns his talents and his courage were so conspicuous that the army on the murder of Hasdrubal in 221 conferred on him the chief command by acclamation. Faithful to his early vow, the young general of 26 years soon manifested his determination to seize whatever oportunity might offer itself of commencing hostilities with Rome. This object was effected in 219 B. C. by laying siege to Saguntum, a town which had concluded an alliance with that city. In eight months Saguntum fell. The Romans alarmed by the fate of this city, sent ambassadors to Carthage to demand that Hannibal should be delivered up. The demand being refused, they declared war. Hannibal raised a powerful force and conceived the bold design of attacking the Romans in Italy.

After having provided for the security of Africa, and having left his brother Hasdrubal with an army in Spain he began his march with 90,000 foot soldiers, 40 elephants, and 12,000 horsemen, traversed Gaul in the depth of winter with incredible rapidity and reached the foot of the Alps. In nine days he crossed these mountains, probably by the pass leading over the Little St. Bernard. Of the troops with which he had set out, however, he had now only 20,000 foot soldiers and 6,000 horse remaining, and these were little more than skeletons. But his courage remained unshaken, and his only alternative was victory or death.

The conquest of the Taurinians and the capture of their chief city secured him a supply of provisions, and encouraged the people of Cisalpine Gaul to join him. These auxiliaries would have been still more numerous had not Publius Scipio approached by forced marches at the head of a Roman army which had landed at Pisa. On the banks of the Ticinus the armies engaged, and a charge of the Numidian horse left Hannibal master of the field (218 B. C.). Scipio avoided a second battle and retreated beyond the Trebia, leaving the strong town of Clastidium in the enemy's hands. Meanwhile Sempronius arrived with a second army which held the Carthaginian leader in check for a while; but Hannibal soon provoked his impetuous adversary to an engagement, disposed an ambuscade near the Trebia, and surrounded and destroyed the Roman forces. The Romans lost their camp and 26,000 men. Hannibal now retired to winter quarters among his allies in Cisalpine Gaul; and at the opening of the next campaign (217) he found two new armies awaiting his approach in the passes of the Apennines. He determined to engage them separately and destroy Flaminius before the arrival of his colleague. He deceived him, therefore, by feigned marches, crossed the Apennines and traversed the Clusian marsh.

During the ensuing four days and nights the Carthaginians were marching through water. Even Hannibal, who had mounted the only remaining elephant, saved himself with difficulty, and lost an eye in consequence of an inflammation. He had scarcely regained firm footing when he employed every means to compel Flaminius to a battle. He wasted the whole country with fire and sword and feigned a march to Rome, but suddenly formed an ambush in a narrow pass surrounded by almost inaccessible rocks. Flaminius, who inconsiderately followed him, was immediately attacked; a bloody engagement took place near the Lake Trasimenus, in which Roman valor was overcome by artifice and superior skill. Assailed on every side, the Roman legions were cut in pieces without being able to display their columns. We are told that the struggle was so fierce that an earthquake shock passed unfelt by the armies engaged. Enriched with the spoils of the conquered, Hannibal now armed his soldiers in the Roman manner and marched into Apulia, spreading terror wherever he approached.

Rome, in consternation, intrusted her safety to Fabius Maximus, the dictator, who determined to exhaust by delay the strength of the Carthaginians. He attacked Hannibal with his own weapons and hung on him everywhere without attempting to overtake him, convinced that the Carthaginians could not long hold a

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desolated territory. These were led by their general into the plains of Capua, with the design of separating the terrified cities from their alliance with the Romans and drawing down Fabius from the mountains. But Hannibal suddenly found himself in the same toils in which Flaminius had perished. Shut up between the rocks of Forminæ, the sands of Lecsternum, and impassable marshes, he was indebted for his safety to a stratagem. Having collected 1,000 oxen, and fastened burning torches to their horns, he drove the furious animals at midnight into the defiles which were guarded by the Romans. Panic-struck at the terrible sight, they abandoned the heights and Hannibal forced his way through their ranks. The Romans, dissatisfied with the delay of Fabius, now made Minutius Felix, master of the horse, his colleague in the dictatorship. Eager for combat, he fell into an ambush at Geronium, and would have perished but for the aid of Fabius. After this campaign the other Roman generals seemed unwilling to trust anything to chance, and imitated the delay of Fabius. Hannibal saw with grief his army slowly wasting away, when the new consul Terentius Varro, an inexperienced and presumptuous man, took the command of the legions. Hannibal had occupied Cannæ and reduced the Romans to the necessity of risking an engagement (216). Paullus Æmilius, the colleague of Varro, wished to put off the battle on account of the disadvantageous position of the Romans; but Varro chose the day of his command, gave the signal for the attack, and the Roman army was practically destroyed.

Hannibal now marched to Capua which immediately opened its gates. The three following campaigns — those of 215, 214, and 213 — were comparatively unimportant. In 215 he sustained at the hands of Marcellus a repulse before Nola — the first check which he had received in the open field. In 212 B. C. he made an important acquisition in the capture of Tarentum which he had been previously watching for two years; but this gain was only partial, as the citadel still remained in the hands of the Romans. The gain was counterbalanced by the loss of Syracuse in Sicily, which had espoused the Carthaginian cause but fell in the same year as Tarentum.

The possession of Capua was likewise endangered. That city was invested by two consular armies and was on the point of surrendering. Hannibal hoped to save it by a bold diversion. He marched to Rome and encamped in sight of the capitol 211 B. C.; but the Romans were not thus to be discouraged; Capua fell. This success gave the Romans a decided superiority, and nearly all the people of Italy declared in their favor. Held in check by the consul, Claudius Nero, Hannibal could not effect a union with his brother Hasdrubal, who had set out from Spain with reinforcements, but after having passed the Apennines was attacked and defeated by Nero on the Metaurus in 207. Hasdrubal himself fell, and his bloody head was thrown into the camp of Hannibal. The latter then retired to Bruttium, where, surrounded with difficulties, he yet maintained the contest with inferior forces against victorious armies. But Scipio now carried the war into Africa and made Carthage tremble; and Hannibal was recalled to defend his country. He reluctantly embarked his troops, and in 203 left the country which for 16 years he had held in spite of all the efforts of Rome. He landed at Leptis, gained over a part of the Numidians, and encamped at Adrumetum. Scipio took several cities and reduced the inhabitants to slavery. Pressed by his countrymen to come to a decisive engagement, Hannibal advanced to meet him, and in 202 encamped at Zama, five days' journey from Carthage. The two generals had an interview and Hannibal proposed terms of peace, but in vain. Hannibal was defeated; 20,000 Carthaginians were left on the field and as many more taken prisoners. Hannibal fled to Adrumetum, rallied the fugitives, and in a few days collected a new army capable of checking the conqueror's progress. He then hastened to Carthage and declared to the senate that there was no safety but in peace and persuaded that body to accede to the terms offered. The negotiations were not completed, however, till the year following, 201 B. C.

Thus ended the bloody contest of 18 years, doubly fatal to Carthage, which was at once stripped of her former conquests, and of all hope of new ones by the loss of her fleet. Hannibal, nevertheless, still retained his credit and was made commander-in-chief of an army in the interior of Africa. But the partisans of Hanno, his bitterest enemy, continued to persecute him and accused him to the Romans of maintaining a secret correspondence with Antiochus, King of Syria, with the design of lighting anew the flames of war. Ambassadors were accordingly sent to Carthage to demand that he should be delivered up. He saved himself, however, by fleeing to Cercina, and thence to Tyre, where he was received with the greatest honors. He afterward went to Ephesus, to the court of Antiochus, who was then on the point of commencing a war against the Romans.

Here also the famous exile was eagerly welcomed, all the more so because his services were likely to confer great benefit on the King of Syria in his war with the Romans. Hannibal strongly advised that the

war should be carried into Italy, and requested of Antiochus an army to do this. But the latter refused to take the advice and Hannibal did not receive the command that he desired. He was indeed appointed to the command of the Syrian fleet, and attacked the Rhodians, who were allies of Rome; but owing to the treachery of one of his officers, he was forced to retreat. Antiochus himself was led by a series of misfortunes and errors, which culminated in the defeat of Magnesia, 190 B. C., to conclude a disgraceful peace, one of the terms of which was that Hannibal should be delivered up. Hannibal was again obliged to flee to escape being delivered up to the Romans, and went to the court of Prusias, King of Bithynia, who was animated by the same spirit of hostility against the Romans. He was the soul of a powerful league formed between Prusias and several neighboring princes, against Eumenes, King of Pergamus, an ally of Rome, took the command of the military force, and gained several victories by land and sea. Notwithstanding these advantages Asia trembled at the name of Rome; and Prusias, to whom the senate had sent ambassadors to demand the person of Hannibal, was on the point of complying with the requisition when Hannibal prevented the disgrace by swallowing poison which he carried in his ring. He died 183 B. C.

Hannington, James, an English clergyman, first Bishop of Eastern Equatorial Africa; born in Hurstpierpoint, Sussex, England, Sept. 3, 1847. He became a student of St. Mary Hall, Oxford, in 1868, and was ordained in 1873. In 1882, after seven years' labor in his native parish, he volunteered for missionary work in Africa, and was sent out by the Church Missionary Society to reinforce their missionaries in Uganda. But his health broke down when he reached Kagei, on the S. shore of Victoria Nyanza, and he was obliged to return home to England. His health improving, he was, June 24, 1884, consecrated Bishop of Eastern Equatorial Africa, and in the following January entered his new diocese, taking up his quarters at Frere Town, near Mombasa. In July, 1885, he started once again for the interior, the object of his journey being to reach the mission-station of Rubaga, in Uganda. But, after successfully surmounting the difficulties and dangers of the road through the land of the Masai, he was slain by order of Mwanga, King of Uganda, at a place not far from the right bank of the Nile, Oct. 29, 1885.

Hanno, a king or magistrate of Carthage who undertook a celebrated voyage of discovery along the W. coast of Africa. His expedition is said to have consisted of 60 ships; he founded numerous colonies or trading-stations, and proceeded as far S. as a point that has been variously identified with places between Cape Nun and the Bight of Benin. On his return to Carthage he inscribed an account of his voyage on a tablet, and placed it in the temple of Moloch. It seems to have been written in the Punic language; the version of it which remains, entitled the "Periplus of Hanno," is only a Greek translation. The date of the voyage has been assigned to different periods between 570 B. C. and 470 B. C., and the identification of the author of it has also been a subject for dispute.

Hanoi (hä-nō'i), the capital of Tonkin, and headquarters of the French administration on the left bank of the Song-coi or Red river, 80 miles in a direct line from the sea. The commercial city has a river front of 1½ mile; the citadel behind contains within its walls most of the official buildings. Embroidery and work in mother-of-pearl are the chief local industries. Pop. (1902) 150,000.

Hanover, formerly a kingdom in the N. W. of Germany, now a province of the kingdom of Prussia; bounded N. by the German Ocean and the duchies of Holstein and Lauenburg, from which it is separated by the Elbe; N. E. by Mecklenburg-Schwerin; E. by Prussia and Brunswick; S. by Prussian Saxony, Hesse-Cassel, and Rhenish Prussia; and W. by Holland; lat. 51° 18′ to 53° 52′ N.; lon. 6° 40′ to 11° 35′ E. It is of very irregular shape; and, by the interjection of the duchy of Oldenburg in the N., and of a long irregular belt of Brunswick in the S., is divided into three distinct portions — the first, and far largest, forming Hanover proper, situated on the E., and tolerably compact; the second on the W., and separated from the former by Oldenburg and Rhenish Prussia, except at one spot, where the continuity is maintained by a narrow tract, not more than 6 miles wide; and the third in the S., completely isolated from the other two. Besides these three principal, there are three minor portions, all in the S., and so small as not to require separate notice; and a range of sandy islands lining the coast. Total area (including the Prussian Jadegebiet, acquired from Oldenburg in 1853, and joined to the province of Hanover on April 1, 1873) 14,869 square miles; capital, Hanover. Within the territory are included part of Brunswick and the free town of Bremen. It is divided into six regierungsbezirke or districts, and, according to the census of Dec. 1, 1905, had a total population of 2,759,544.

Physical Features.— The surface in the S. is covered by the Harz mountains, some of whose summits there attain a height of more than 3,000 feet; but all the rest of the country belongs to the W. part of the great plain which stretches E. across Prussia and Russia, and only terminates at

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the foot of the central plateau of Asia. In Hanover this plain, after free of the N. slopes of the Harz, subsides into an extensive, and often dreary, monotonous flat, with a gentle slope to the North Sea, to the basin of which it wholly belongs. The only exception to the general flatness is caused by branches of the Harz, of moderate height, one of which stretches in a N. N. W. direction, and forms the watershed between the Ems and the Weser. Of these two rivers the former traverses the W. portion of the province S. to N., while the latter runs N. W. through the E. portion, and drains the greater part of it, either directly, or by its combined tributaries the Leine and Aller; the only other river of consequence is the Elbe which forms the boundary of a considerable portion of the province, but is not augmented within it by any important tributary. The Harz mountains are rich in minerals, which have long been worked to a great extent, the produce including a little gold, besides silver, zinc, copper, and iron. A branch of the Harz, between the Leine and Weser, produces both coal and lignite; and in several quarters rock-salt is found in large quantities. In the N. of the province there are large peat beds, which supply most of the fuel used in those parts, and even furnish considerable quantities for export to the S., as well as to Hamburg, Bremen, etc.

Agriculture.—In the low alluvial flats the soil is remarkably rich, but usually so overcharged with moisture that it cannot be safely brought under the plow, and is much more profitably employed by being allowed to remain in natural, or formed into artificial, meadows, which yield heavy crops of hay, or feed large numbers of cattle of a very superior description. Where the ground attains a higher elevation the soil often consists either of a thin vegetable mold on a substratum of sand, so poor as often to be left in a state of nature with its covering of heath, or of deep beds of peat. But, after deducting these two classes of soil, there remain extensive tracts of arable land, amounting to one-fourth of the whole surface, of good medium fertility, and so industriously cultivated as to produce more corn than is required by the home consumption. Flax also, for which much of the soil is admirably adapted, is extensively cultivated, and forms an article of export, especially in the form of yarn. The keeping of bees is very generally practised on the moors. Forests occupy nearly one-sixth of the whole surface. They consist of hard wood and pine in nearly equal quantities, and are extensively used in smelting.

Manufactures and Trade.—The extent to which mining operations are carried on in the Harz has been already mentioned. They form, along with agriculture, highly important branches of national industry. Manufactures, formerly of little importance, have made great advances in modern times, especially in the capital itself, and in other towns in the S. of the province, such as Osnabrück, Hildesheim, Göttingen, Hameln, etc. The making of linens and woolens, the former to a large extent still a domestic industry, has long been actively pursued; the cotton manufacture is a more modern industry and there are now some large mills engaged in spinning and weaving. Other manufactured goods include leather, paper, tobacco and cigars, india-rubber and gutta-percha goods. Machinery and iron goods employ a number of hands, as also beet-root sugar, oil, chemical products, beer, and spirits. Hanover has not much of its own produce to export, and is consequently very much restricted as to imports on its own account. It possesses several ports, among which are Emden, Geestemünde, and Harburg, but Bremen is really the chief port for Hanover.

People.—Taken as a whole, Hanover is very thinly peopled and in proportion to its extent of surface has much fewer towns of importance than any other country in Germany. The inhabitants are generally of Saxon origin except in the W., where they have a common origin with the Dutch, and are of Frisian extraction. They are simple, temperate, industrious, and patient; submitting almost without a murmur to live on the humblest fare and give themselves little concern with political arrangements. The educated classes, of course, speak the ordinary written language, but the lower orders generally speak Low German. The great majority of them are Protestants of the Lutheran persuasion. The Roman Catholics do not exceed one-seventh of the whole, and are almost entirely confined to the districts of Hildesheim and Osnabrück.

Government.—This, previous to its annexation to Prussia in 1866, was a hereditary monarchy in which the Salic law was in force. The greater part of the population seemed readily to acquiesce in the new order of things and most of the officials passed over into the service of the Prussian rulers, but the nobility, Lutheran clergy, etc., were less easily reconciled, or remained irreconcilable, and the present Duke of Cumberland still claims to be the rightful king. Hanover, however, has been more and more closely incorporated with the rest of the Prussian dominions, special laws having been passed with that object in view, one in particular putting an end to the preponderance of the landowners in the provincial diet. The province sends 36 members to the Prussian chamber of deputies and 10 to the House of Lords (Herrenhaus). The highest court of the province is in Celle.

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History.— The countries of which the kingdom of Hanover is now composed were, in early times, the theater of protracted contests between the Saxons and the Romans. The N. parts were inhabited by Chauci; the center by Longobardi, Chamavi, Sicambri, Cherusci, etc., and the S. by Chatti, who, at a later period, advanced as far as the Aller. After the Romans lost their footing in the country, and the Longobardi were expelled from it, the Saxons became sole possessors, and divided it into three principal parts — Ostphalen, Engern, and Westphalen. The first great steps in civilization were taken by Charlemagne; who, having subdued the Saxons, introduced Christianity and founded several bishoprics. Wittekind, the Saxon leader, by becoming a Christian, lost much of his influence with the great body of his countrymen, who still continued pagans, but was allowed to possess his hereditary States. Charlemagne placed the newly-conquered territory under the government of Count Egbert, whose descendants remained in the possession of certain lands here, with the title of Dukes of Saxony, till about the middle of the 10th century the Emperor Otto bestowed it as a fief on Hermann Billing, who already possessed considerable estates about the same quarter and who now became the most powerful prince in what is now called Hanover. The dynasty of Hermann became extinct with Magnus in 1106, when the duchy of Saxony passed to Lothaire, afterward emperor, and the hereditary estates of the house of Billing passed to the house of Guelph by the marriage of the eldest daughter of Magnus to Henry the Black, Duke of Bavaria, who subsequently greatly extended his possessions by the addition of the principalities of Brunswick, Göttingen, etc. His son, Henry the Proud, inherited all his dominions, and also acquired the duchy of Saxony by his marriage with Gertrude, the daughter of the Emperor Lothaire. Their son, Henry the Lion, made many new conquests, and became so powerful as to excite the jealousy of the emperor, who placed him under the ban of the empire and succeeded in stripping him of the greater part of his dominions. On his death shortly after, in 1195, the possessions left to him were shared by his three sons, the issue of his marriage with a daughter of Henry II. of England. William, the third of the sons, was the only one who had male heirs. Through them the lines of Brunswick-Wolfenbüttel and of Brunswick-Lüneburg were ultimately formed. Ernest Augustus, one of the princes of the latter branch, after making several important additions to his territories, was raised to the dignity of Elector of Hanover in 1692, and married the daughter of the Elector Palatine, granddaughter of James I., and niece of Charles I. of England. He was succeeded in 1698 by his son, George Louis, who, in accordance with the Revolution settlement of 1688, became sovereign of England, under the name of George I., on the demise of Queen Anne, in 1714. The connection thus formed with the crown of England continued during four succeeding reigns, in which considerable additions of territory were made. In 1814 the Congress of Vienna raised Hanover to the rank of a kingdom. Two independent crowns were thus worn both by George IV. and William IV.; but on the accession of her majesty Victoria to the crown of England the Salic law placed the other crown on the head of the nearest male heir, Ernest Augustus, Duke of Cumberland. His reign passed peacefully while nearly all the other States of Germany were fearfully convulsed. He died in November, 1851, and was succeeded by his son, George V. In 1866, however, Hanover became involved in the Austro-Prussian contest and sided with Austria; the capital was occupied by Prussian troops; the king lost his throne, his estates were sequestrated, and Hanover was absorbed into the dominions of Prussia.

Hanover, capital of the Prussian province of Hanover, situated in an extensive plain on the Leine, which here receives the Ihme and becomes navigable. The old town, irregularly built and with many antiquated buildings, is surrounded by the handsome new quarters which have arisen to the N., E., and S. E. There are fine promenades, and a large wood with beautiful walks, the Eilenriede, lies on the E. side of the city. The principal buildings are the Market Church, the Old Town House, the Theater, one of the finest in Germany, the Royal Palace, the Museum of Art and Science, the Royal Library, containing 175,000 volumes, the Central Railway Station, the Waterloo Monument, etc. About a mile to the N. W. is Schloss Herrenhausen, the favorite residence of George I., George II., and George V. Near the town is the colossal Welfenschloss, or palace of the Guelphs, now fitted up as a polytechnic school. Hanover is a manufacturing town of some importance, has cotton-spinning, machine works, iron foundries, chemical works, tobacco and cigar factories, etc. Hanover is first mentioned in 1163. It joined the Hanseatic League in 1481. It became the residence of the dukes of Brunswick-Lüneburg, and capital of the principality in 1636. Pop. (1910) 299,753.

Hanover, a town of Grafton co., N. H.; on the Connecticut river, and on the Boston and Maine railroad; 55 miles N. W. of Concord. It is a summer resort and the seat of Dartmouth and Dartmouth Medical Colleges, Thayer School of Civil Engineering, and the Mary Hitchcock Hospital. It has a National bank, weekly newspapers,

and an assessed valuation of $1,000,000. Pop. (1900) 1,884.

Hanover College, a coeducational institution in Hanover, Ind., founded in 1828 under the auspices of the Presbyterian Church; has grounds and buildings valued at over $135,000; endowment funds, $230,000; scientific apparatus, etc., $10,000; ordinary income, $18,000; volumes in the library, about 21,000; average number of faculty, 20; average student attendance, 230; graduates, over 950.

Hanover, Treaty of, a treaty concluded between England, France and Russia, in September, 1725, for the purpose of mutual assistance, as opposed to the alliance between Austria and Spain.

Hanseatic League, a celebrated confederacy formed in the 13th century between certain commercial towns, with the view at once of restraining the rapacity of kings and nobles, and clearing the Elbe, the German Ocean, and other places from the pirates and robbers by which they were then infested. Becoming powerful, the League concluded treaties with monarchs, raised troops, and made war, as if it had been an independent political power. At the time when the League flourished most, it consisted of 85 confederate towns. It gave a powerful impulse to commerce, and when in 1631 it in large measure fell to pieces, it left behind various free republics which continued for a long period of time.

Hansen (hän'zen), **Peter Andreas,** a German astronomer; born in Tondern, Schleswig, Dec. 8, 1795. From 1821 to 1825 he was assistant to Schumacher at Altona; from 1825 to 1859 director of the observatory at Seeberg, near Gotha, which observatory in 1859 was transformed to another suburb of Gotha, called Erfurt; and as director here he spent the rest of his life. In 1842 he was awarded the gold medal of the Royal Astronomical Society of Great Britain for his work on the perturbations of Jupiter and Saturn and on the Lunar Theory. In 1857 the British government published his "Lunar Tables" (in French), in which he had embodied the results of his now completed lunar theory. In 1860 the Royal Astronomical Society for the second time conferred upon him its gold medal, and the British government awarded him $5,000 in acknowledgment of his services to astronomy and navigation in the completion of this great work. He died in Gotha, Germany, March 28, 1874.

Hansen, Maurits Christopher, a Norwegian poet; born in Modum, July 5, 1794. His models in fiction seem to have been Fouqué and Tieck. As a poet he is best represented by the volume of "Norse Idylls." His style is limpid, and shows the influence of German studies. He also wrote school grammars, and manuals of literature, that have been widely used in Norway. He died in Kongsberg, March 16, 1842.

Hanslick, Eduard (häns'lik), a German musical critic; born in Prague, Sept. 11, 1825. He surpassed all contemporary workers in the field of musical criticism, holding the position of professor of musical criticism and history in the Vienna University. He was a recognized authority among European authors in music and æsthetics, owing to his wit, imaginative power, and thorough knowledge of his specialties, and perfect command of a luminous and pleasing style. He died Aug. 7, 1904.

Hanssen, Ola (hän'sen), a Swedish-German poet and author; born in Hönsing, Sweden, Nov. 12, 1860. He had a passion for travel; going on foot in his impecunious early years, but his first poems were successful enough to improve his means. His masterpiece was "Love Longings" (Sensitiva Amorosa), brought out in 1887, and since translated in German and French. He lived in Berlin after 1889, and wrote in German with grace and facility. His poems combine vigorous thought with delicate workmanship, and his literary essays are those of an able and learned critic.

Hansteen, Christoph (hän'stān), a Norwegian astronomer; born in Christiana, Norway, Sept. 26, 1784. In 1814 he was appointed to the chair of mathematics in the university at Christiana, and there, in 1819, published his famous work, "Investigations into Terrestrial Magnetism." The scientific results of a journey to the E. of Siberia in 1828–1830 were published in 1863. In 1821 he discovered the "law of magnetic force" (See MAGNETISM). It was chiefly by his initiative that the astronomical and magnetic observatories at Christiana were founded. He was also Professor of Mathematics in the School of Artillery, superintendent of the triangulation of Norway, and reorganizer of the national system of weights and measures. He published lectures on astronomy, a work on mechanics, another on geometry, several on terrestrial magnetism, and numerous memoirs. He died in Christiana, Norway, April 11, 1873.

Hanswurst (häns'vörst), the name of a standing comic character on the older German stage, corresponding in its grotesque traits and mirth-making qualities to the American and English clown or Italian harlequin.

Hanuman. See ENTELLUS MONKEY.

Hanway, Jonas, an English traveler and philanthropist; born in Portsmouth, England, Aug. 12, 1712. Apprenticed at 17 to a Lisbon merchant, he afterward traded at St. Petersburg, and in September, 1743, left that city on an adventurous journey through Russia and Persia, returning in

July, 1750. He published an account of his travels in 1753, and spent the rest of his life mostly in London as one of the commissioners for victualling the navy from 1762 to 1783. He was an unwearying friend to chimney sweeps, parish infants, and unfortunates, and advocated with earnestness solitary confinement for prisoners, and a milder system of punishment generally. He is said to have been the first Englishman to carry an umbrella in London streets. His attack on tea-drinking was less successful, but here he had the honor to be opposed by Dr. Johnson. He died in London, England, Sept. 5, 1786.

Hapgood, Isabella Florence, an American translator and writer; born in Boston, Mass., Nov. 21, 1851. She published "The Epic Songs of Russia," "Russian Rambles," and was well known as a translator of the works of Gogol, Hugo, and other great European writers.

Hapgood, Norman, an American journalist; born in Chicago, Ill., March 28, 1868. He was graduated at Harvard, studied literature in Europe; was dramatic critic for the New York "Commercial Advertiser" and "Bookman," in 1897-1902; editor of "Collier's Weekly" after 1903; published "Literary Statesmen" (1897); "Abraham Lincoln" (1899); "Daniel Webster" (1899); "The Stage in America" (1901).

Happy Hunting Grounds, the region to which the North American Indians believe they will go when they die; a place where there will be everlasting feasting and hunting.

Happy Islands. See ISLANDS OF THE BLEST.

Hapsburg, or **Habsburg** (häps'börg), (properly HABICHTSBURG or HABSBURG, the hawk's castle), a small place in the Swiss Canton of Aargau, on the right bank of the Aar. The castle was built about 1027 by Bishop Werner of Strassburg. Werner II., who died in 1096, is said to have been the first to assume the title of Count of Hapsburg. After the death, about 1232, of Rudolph II., the family divided into two branches, the founder of one of which was Albert IV. In 1273 Rudolph, son of Albert IV., was chosen Emperor of Germany, and from him descended the series of Austrian monarchs, all of the Hapsburg male line, down to Charles IV. inclusive. After that the dynasty, by the marriage of Maria Theresa to Francis Stephen of Lorraine, became the Hapsburg-Lorraine. Francis II., the third of this line, was the last of the so-called "Holy Roman Emperors," this old title being changed by him for that of Emperor of Austria. From the Emperor Rudolph was also descended a Spanish dynasty which began with the Emperor Charles V. (Charles I. of Spain), and terminated with Charles II. in 1700. The castle of Hapsburg is still to be seen on the Wülpelsberg. In 1881 the Austrians proposed to purchase the castle of Hapsburg and give it as a wedding gift to the Crown-prince of Austria; but the people of Aargau refused to hear of the sale.

Haquebut (hak'but). When the handgun and arquebus were first introduced, the butt or stock was perfectly straight, and in the form of a stick or broom handle, which prevented the soldier who was using it from taking a proper aim by directing his eye along the barrel. To obviate this inconvenience and imperfection in the weapon, the Germans fitted the barrel to a hooked butt — whence the name — by which means the firearm could be discharged from the chest as before, while an additional facility was given for taking aim at the object toward which the weapon was directed. It was introduced into England about 1485. The haquebut may be considered as the first step in the long series of improvements in small arms which seem to have culminated in the modern rifles.

Har, the second person of the Hindu Trinity. He has already passed his 9th incarnation; in his 10th he will take the forms, first of a peacock, and then of a horse, when all the followers of Mahomet will be destroyed.

Harakiri (hä'rä-ki-ri), "Happy dispatch"; a method of suicide which members of the Japanese official classes are required to perform when the government considers them to be worthy of death. It is effected by making two gashes in the abdomen somewhat resembling a cross. Suicides sometimes adopt this painful method of death.

Haran (hä'rän), or **Charan** (chä'-), (called by the Greeks Charran, and by the Romans Charræ); a city in the N. W. part of Mesopotamia, on a river of the same name running into the Euphrates. It is supposed to have been so called from Haran, the father of Lot and brother of Abraham; but there appears no ground for this conclusion except the identity of names. Abraham, after he had been called from Ur of the Chaldees, tarried here till his father Terah died, when he proceeded to the land of Canaan (Gen. xi: 31, 32; Acts vii: 4). The elder branch of the family still remained at Haran, which led to the interesting journeys thither, described in the patriarchal history — first, that of Abraham's servant to obtain a wife for Isaac (Gen. xxiv.), and next, that of Jacob when he fled to evade the wrath of Esau (Gen. xxviii: 10). The plain bordering on this town is celebrated in history as the scene of a battle in which the Roman army was de-

feated by the Parthians, and the triumvir Crassus killed. Haran still retains its ancient name in the form of Harran, and is only peopled by a few families of wandering Arabs, who are led thither by a plentiful supply of water from several small streams. It is situated in a flat and sandy plain.

Harar (hä-rär′), a city of Africa, in the country of the Gallas, about 200 miles W. S. W. of Berberah; on the slopes of the mountains which surround it, Mount Hakim on the W. rising to 8,400 feet. It is fenced with a low wall and forts, the wall being pierced by five gates. The streets are simply water-channels crossing the uneven surface; the houses are partly stone edifices, partly huts. In the neighborhood are fine banana groves and coffee gardens. Coffee, hides, cattle, and a dyestuff called wars, are the principal objects of commerce. Harar, which was converted to Islam in 1521, was formerly the capital of an independent state. In 1875 the State was conquered by the Egyptians, who, however, handed it back to its native emir the same year, and in 1899 Great Britain and Egypt recognized it as a part of Abyssinia. Pop. about 37,000.

Harbor, a portion of a sea, a lake, or other large body of water, either landlocked or artificially protected so as to be a place of safety for vessels in stormy weather; a port or haven (Internat. Dict.). Harbors may be roughly classified into harbors of refuge, and harbors of refuge and commerce. All good harbors should possess the following characteristics: A deep, broad entrance-channel, which can be kept by ships of all kinds in all sorts of weather; an ample anchorage, free from rocks and shoals, with good holding ground and protected from winds and waves. Commercial harbors should, in addition, be supplied with adequate constructions and appliances for loading and discharging vessels. A clear distinction exists between commercial shipping points and harbors; *e. g.*, Madras, India, before the construction of the great artificial harbor, was simply a point for shipment. The anchorage of a harbor should be large enough to afford shelter to the maximum number of vessels seeking it. The space required by a vessel at anchor is, roughly, a circle whose radius is six times the depth of water plus the vessel's length. First-class harbors should have a depth of 40 feet to admit and give secure anchorage to the largest ships now existing. An available depth of 25 feet is sufficient for ordinary transatlantic freight and passenger steamers. Coasting vessels rarely have a draught of more than 20 feet.

Some of the best known natural harbors are those of Queenstown, Ireland; Rio de Janeiro, Brazil; Portland, Me.; Boston, Mass.; Narragansett Bay, R. I.; New York, N. Y.; Old Point Comfort (Norfolk), Va.; Port Royal, S. C.; Havana, Cuba; San Francisco, Cal.; Puget Sound, Wash.; King George's Sound and Princess Royal Harbor, in S. W. Australia.

Harbor Grace, a port of entry and the second town of Newfoundland, on the W. side of Conception Bay, 84 miles W. N. W. of St. John's. It has a large but somewhat exposed harbor, with a revolving light, and carries on a considerable trade. It is the seat of a Roman Catholic bishop, and contains a Catholic cathedral and convent. Pop. (1901) 5,184.

Harburg (här′börg), a seaport of Prussia, in the province of Hanover, 5 miles S. of Hamburg, on the Elbe. Its industries include gutta-percha goods, palm-oil, cotton-seed oil, saltpeter and other chemicals, artificial manure, walking-sticks, leather, mineral water, machines, beer, and jute. Since the deepening of the Elbe the commerce of Harburg has greatly increased, It is a place of holiday resort for the Hamburgers. Pop. (1905) 55,676.

Harcourt, Sir William George Granville Venables Vernon, an English lawyer and politician, son of the Rev. William Vernon Harcourt; born Oct. 14, 1827. He was educated at Trinity College, Cambridge, was called to the bar in 1854, became Queen's Counsel in 1866; contributed frequently to the press, in particular the letters to the "Times" signed "Historicus"; was returned for Oxford city in 1869 in the Liberal interest; distinguished himself by his powers of satire and ridicule in debate; was made solicitor-general in Mr. Gladstone's ministry, November, 1873; home secretary in 1880, when he lost his seat for Oxford, but was returned for Derby. He introduced the Arms Bill (Ireland), 1881; Prevention of Crimes Bill, 1882; an Explosives Bill, 1883. In February, 1886, he was made chancellor of the exchequer; and after the resignation of Mr. Gladstone's ministry became a prominent leader of the Gladstonian section; in 1892 was reappointed chancellor. He died Oct. 1, 1904.

Hardanger Fjeld (här′däng-er fēld), a portion of the great Scandinavian chain of mountains, about 70 miles N. E. of Bergen, Norway; average height, 4,000 feet.

Hardanger Fjord (fyôrd), a famous fjord of Norway, 75 miles long, off the S. W. coast; lat. about 60° N. It is surrounded by mountains and snow fields, and noted for its grandeur. Near by are the Folgefond and the Vöringsfos.

Hard Cancer, schirrus. It is remarkable for its excessive firmness, and cartilaginous and stony hardness. The substance is not one uniform, homogeneous mass, but intersected by bands, which radiate from

the center into the surrounding textures, implicating them also in the disease, sometimes dividing into small bands, or intersecting each other.

Hardee, William J., an American military officer; born in Savannah, Ga., Oct. 10, 1815; was graduated at the United States Military Academy in 1838; served with distinction in the Mexican War; in the Civil War entered the Confederate army with the rank of colonel; commanded a corps at Shiloh; promoted to lieutenant-general in 1862; commanded the left wing of the Confederate army at Perryville; defended Savannah against General Sherman in December, 1864. He died in Wytheville, Va., Nov. 6, 1873.

Hardenberg, Frederick von. See NOVALIS.

Hardenberg, Karl August, Prince von, a famous Prussian statesman; born in Essenroda, Hanover, May 31, 1750. In 1790 he entered the service of the king of Prussia, whose minister for foreign affairs he became in 1806. At the close of the wars of the first French empire he signed the treaty of peace at Paris in 1814. To Hardenberg Prussia is mainly indebted for the improvements in her army system, the abolition of serfdom, of the privileges of the nobles, and of a multitude of trade corporations, the encouragement of municipal institutions, and the reform of her educational system. Yet in his later years he was unable to overcome the reactionary tendencies of the king; all he could do was to moderate them and prevent them running to excess. He died in Genoa, Nov. 26, 1822.

Harderwijk (här'der-wīk), a fishing-town of the Netherlands, on the S. E. shore of the Zuider Zee, 31 miles N. E. of Utrecht. From 1648 to 1811 it was the seat of a university. It is now a depot for recruits for the Dutch East Indian army.

Hardfern, the popular name for *Lomaria spicant,* which is also known as *Blechnum boreale.* It is a very common fern, being found everywhere in Great Britain growing on heaths, in glens, on old roadside walls, etc.

Hardhack, the American popular name of a plant, the *Spiræa tomentosa,* common in pastures and low grounds, and celebrated for its astringent properties, which cause it to be used medicinally.

Hardicanute (-nūt'), a king of England, son of Canute the Great and Emma of Normandy, the widow of Ethelred II.; born about 1019. At the time of his father's death (1035) Hardicanute was in Denmark, and the throne was given to Harold, his younger brother; Wessex, however, was reserved for the absent prince, whose claims to the kingdom were upheld by Godwin and Emma. On the death of Harold, in 1040, Hardicanute was elected king in his place. In the short space of two years he provoked the discontent of his subjects by the imposition of a very heavy danegeld. He died in Lambeth, near London, June 8, 1042.

Harding, Karl Ludwig, a German astronomer; born in Lauenburg in 1765. Called to be a tutor to the son of the illustrious Schröter, he was drawn from the Church into astronomy and became Schröter's assistant. In 1805 he was appointed Professor of Astronomy in the University of Göttingen, and remained in this position till his death. He discovered the asteroid Juno, the third of the small planets, in 1804, and compiled a set of star maps, which were for a long time the most accurate of any in existence. He died in Göttingen in 1834.

Hardinge, Mrs. Belle Boyd. See BOYD, BELLE.

Hardinge (-ding), **Henry Hardinge, Viscount,** a British soldier and governor-general of India; born in Wrotham, Kent, England, March 30, 1785. Gazetted an ensign in 1798, he served through the Peninsular war, being wounded at Vimiera and Vittoria, and taking a decisive part in the sanguinary contest at Albuera. From 1809 to 1813 he was also attached to the Portuguese army as a deputy quartermaster-general. On the renewal of hostilities after Napoleon's escape from Elba, he hastened to join Wellington, who appointed him commissioner at the Prussian headquarters. In consequence of a severe wound received at Ligny he was unable to take part in the battle of Waterloo. From 1820 to 1844 he was active in Parliament, holding the office of Secretary of War under Wellington in 1828, and afterward the chief secretaryship of Ireland under the same duke and under Peel. In 1844 he was appointed governor-general of India. He was present at the battles of Mudki, Firozshah, and Sobraon in the first Sikh war, as second in command to Lord Gough. After the peace of Lahore (1845) he was created a viscount, and granted a pension of $25,000 by the East India Company as well as one of $15,000 for three lives by Parliament. Four years after his return to England he succeeded (1852) Wellington as commander-in-chief of the British army. In 1855 he was made field-marshal. In July of the following year he resigned the office of commander-in-chief, and died in South Park, near Tunbridge, England, Sept. 24, 1856.

Hard Tack, a large, hard biscuit or cracker, made for the use of soldiers on the march. It takes 14 of them to make

a pound. About 20 of these crackers are served to each man every day. When the soldiers were about to be shipped from Tampa to Cuba, during the war with Spain (1898), two factories in Atlanta furnished the government in two days with 80,000 pounds or 1,120,000 of hard tack.

Hardwár (hur-dwâr′), or **Hari=dwára** (literally "gate of Hari, that is, Vishnu"), also called **Gangá=Dwára** ("Ganges gate"), a city situated on the right bank of the Ganges, where the river emerges from the sub-Himalaya into the plains of Hindustan, 39 miles N. E. of Saharunpur, Northwest Provinces. It attracts immense numbers of pilgrims at the end of March and the beginning of April, a great fair at the same time engrafting commerce on religion. In ordinary years the attendance is about 100,000; but every 12th year peculiarly sacred rites take place, attended by perhaps 300,000 (formerly 2,000,000). Since 1891 elaborate and successful efforts have been made by means of rigid and scientific sanitation to prevent the fair from being, as heretofore, a great means of spreading cholera. Hardwár is 1,024 feet above the sea. Pop. about 7,000.

Hardy, Arthur Sherburne, an American novelist; born in Andover, Mass., Aug. 13, 1847. He was graduated from the United States Military Academy and commanded a military post in the South for two years; then was Professor of Civil Engineering in Iowa and Dartmouth Colleges; and Minister to Persia in 1897-1899, to Greece, Rumania, and Servia, in 1899-1901, to Switzerland in 1901-1903, and to Spain in 1903-1905. "But yet a Woman" and "The wind of Destiny" are among the more important of his novels. "Passe-Rose" is a French idyl. His poems were published in numerous magazines, and some of his mathematical studies took shape in a volume on "Quaternions."

ARTHUR S. HARDY.

Hardy, Gathorne, 1st Earl of Cranbrook, an English statesman; born in Bradford, England, Oct. 1, 1814; was educated at Oxford University, called to the bar in 1840; entered Parliament in 1847; became home secretary, 1867–1868; war secretary, 1874–1878; secretary for India, 1878–1880; lord president of the council, 1885-1886 and 1886-1892; Earl of Cranbrook, 1892. He died Oct. 30, 1906.

Hardy, Iza Duffus, an English novelist, daughter of Sir Thomas D. Hardy. She began story-writing very early, and was a frequent contributor to the magazines. Among her numerous novels are: "Glencairn" (1877); "Only a Love Story" (1877); "A Broken Faith" (1878); "The Love that He Passed By" (1884), an American novel; "A Woman's Loyalty" (1893); and two volumes of transatlantic reminiscences, "Between Two Oceans" (1884) and "Oranges and Alligators: Sketches of South Florida Life" (1886).

Hardy, Thomas, an English novelist; born in Dorset, England, June 2. 1840. He was brought up as an architect, and practised some time at Dorchester, next prosecuted his studies in design at London, gaining professional distinction. His intention was now to become an art critic but the experiment of a not wholly unsuccessful work of fiction, "Desperate Remedies" (1871; new ed. 1889), shaped his destiny otherwise. His next novels, "Under the Greenwood Tree" (1872) and "A Pair of Blue Eyes" (1873), prepared the way for his first great work, "Far from the Madding Crowd," published in the "Cornhill Magazine" in 1874. Its immediate success secured its author an audience for a series of novels: "The Hand of Ethelberta" (1876); "The Return of the Native" (1878); "The Trumpet-major" (1880); "A Laodicean" (1881); "Two on a Tower" (1882); "The Mayor of Casterbridge" (1886); "The Woodlanders" (1887); "Tess of the D'Urbervilles" (1891); and "Jude the Obscure" (1895). "Wessex Tales" appeared in 1888, "A Group of Noble Dames" in 1891, "Life's Little Ironies" in 1894, "The Three Wayfarers" in 1893, and "Wessex Poems" in 1898.

THOMAS HARDY.

Hardy, Sir Thomas Duffus, an English palæographer; born in Jamaica, W. I., in 1804. The son of a major of artillery, at 15 he became a junior clerk in the Record Office in the Tower and here quickly became an expert in reading ancient MSS. In 1861 he

succeeded Sir Francis Palgrave as deputy-keeper of the Public Records. He was knighted in 1870. He published two folio volumes of the early "Close Rolls" (1833–1844), one of the "Patent Rolls" (1835), and others of the "Norman Rolls" (1835) and "Charter Rolls" (1837); "William of Malmesbury" (1840); "Catalogue of Lord Chancellors, Keepers of Great Seal, Masters of Rolls, etc."; "Mode of Holding Parliament" (1846); "Descriptive Catalogue of MSS. Relating to the History of Great Britain and Ireland" (1862–1871); "The Register of Richard de Kellawe, 1311–1316" (1873–1878), etc. He died in London, England, June 15, 1878.

Hardy, Fort, a Revolutionary fort now in ruins, at the confluence of the Fishkill creek and the Hudson river, near Saratoga, N. Y.

Hardyng, or **Harding, John,** an English rhyming chronicler; born in 1378. He was brought up in the household of Harry Percy, the famous Hotspur, whom he saw fall on Shrewsbury field in 1402. Pardoned for his treason, he served under Sir Robert Umfraville, became constable of Warkworth Castle, fought at Agincourt, and served the crown in confidential and critical missions to Scotland. His chronicle, composed in limping stanzas, and treating the history of England from the earliest times down to the fight of Henry VI. into Scotland, he rewrote and presented to Edward IV. just after his accession. The account of the Agincourt campaign has at least the interest of the eye-witness. Hardyng's "Chronicle" was continued by the printer Richard Grafton down to the 34th year of the reign of Henry VIII., but Grafton's work is little more than a recast of Hall. He died about 1465.

Hare, in zoölogy, various species of *Lepus,* specially *L. timidus.* It does not make a burrow like the rabbit, but lurks in

COMMON HARE.

a seat or form, which it varies according to the season, and in severe weather betakes itself to the woods. It is, properly speaking, a nocturnal animal and is very prolific. The hare of Scripture (Hebrew *arnebheth,* Lev. xi: 6 and Deut. iv: 7) seems to be correctly rendered. It is here arranged with the ruminants, perhaps on account of a certain movement of the lips like that of those animals, but modern science places it among the rodents, with which its anatomical construction entirely agrees. In astronomy, Lepus, one of the 15 ancient S. constellations.

Hare, Augustus John Cuthbert, an English descriptive writer; nephew of A. W. and J. C. Hare; born in Rome, Italy, March 13, 1834. He was a graduate of Oxford. The son of a rich father he was enabled from his earliest youth to gratify a taste for travel, on descriptions of which his fame chiefly rests. Among his happiest efforts are: "A Winter at Mentone" (1861); "Walks in Rome" (1870); "Wanderings in Spain" (1872); "Walks in London" (1877); "Days near Paris" (1887); a narrative of travel in Southern France, and "Personal Recollections" (1895). He died Jan. 22, 1903.

Hare, Augustus William, an English clergyman and writer, brother of J. C. Hare; born in Rome, Italy, Nov. 17, 1792. He was educated at Winchester and New College, Oxford, where he became a Fellow in due course. He was appointed in 1829 to the retired living of Alton Barnes, in Wiltshire, and married in 1829 the gifted Maria Leycester (1798–1870). He shared with his brother in the authorship of "Guesses at Truth." Died in Rome, Italy, Feb. 18, 1834.

Hare, John, an English actor; born in London, England, May 16, 1844. Traveled largely in the United States at the head of his own company, and was celebrated for his portrayal of emotional rôles.

Hare, Julius Charles, an English theologian; born near Vicenza, Italy, Sept. 13, 1795. He spent part of his boyhood in Germany, and after his return was sent to the Charterhouse, from which in 1812 he passed to Trinity College, Cambridge. Here he was elected to a fellowship in 1818, and afterward became classical lecturer. He tried the study of law, but soon abandoned it, took orders in 1826, and succeeded his uncle in the rich family living of Hurstmonceaux, Sussex, in 1832. In 1844 he married Esther Maurice, sister of Frederick Maurice. He became Archdeacon of Lewes in 1840, in 1853 chaplain to the queen. In 1827 he published anonymously "Guesses at Truth," written in conjunction with his brother Augustus. His next work was the translation of Niebuhr's "History of Rome" (1828–1832) in collaboration with Thirlwall, and his own "Vindication of Niebuhr's History" (1829). His most important contributions to theology are "The Vic-

tory of Faith" (1840) and "The Mission of the Comforter" (1846). In 1848 he edited the "Remains of John Sterling," with a life. Other books are "Parish Sermons" (1841–1849) and a "Vindication of Luther Against His Recent English Assailants" (1854). He died in Hurstmonceaux, Sussex, England, Jan. 23, 1855.

Hare, Robert, an American scientist; born in Philadelphia, Pa., Jan. 17, 1781; was Professor of Chemistry in the University of Pennsylvania in 1818–1847. His fame rests chiefly on the valuable discovery of the oxyhydrogen blowpipe to which he gave the name "hydrostatic blowpipe." His other inventions include the valve-cock or gallows-screw, the calorimeter and a process for denarcolizing laudanum. His publications include: "Brief View of the Resources of the United States" (1810); "Chemical Apparatus and Manipulations" (1836); "Compendium of the Course of Chemical Instruction in the Medical Department of the University of Pennsylvania" (1840); "Memoir on the Explosiveness of Niter"; etc. He died in Philadelphia, Pa., May 15, 1858.

Hare and Hound. See COURSING.

Harebell. See BLUEBELL.

Harefoot. See HAROLD I.

Hareld (*Harelda*), a genus of the duck family (*Anatidæ*), having a short thick bill, and two feathers of the middle of the tail, in the males, greatly elongated. Two species are known; the best known, the long-tailed duck or hareld (*H. glacialis*), inhabits the arctic regions both of the Old and New Worlds, its winter migrations in the United States extending as far S. as the Carolinas.

Harelip, usually a congenital malformation, and frequently hereditary, chiefly occurring in the upper lip, and having one fissure only; if there are two it is called a double harelip. Harelip, besides being a great deformity, is attended with defect of speech and often a cleft of the upper jaw and palate bones, converting the mouth and nose practically into one cavity. In ordinary cases a cure by means of operation is easily effected.

Harem (hä-rēm′) (Arabic, the prohibited), a word used by Mussulmans to signify the women's apartments in a household establishment, forbidden to every man except the husband and near relations. The women of the harem may consist simply of a wife and her attendants, or there may be several wives and an indefinite number of concubines or female slaves, with black eunuchs, etc. The greatest harem is that of the Sultan of Turkey. The women of the imperial harem are all slaves, generally Circassians or Georgians. Their life is spent in bathing, dressing, walking in the gardens, witnessing the voluptuous dances performed by their slaves, etc. The women of other Turks enjoy the society of their friends at the baths or in each other's houses, and appear in public accompanied by slaves and eunuchs; but the women of the sultan's harem have none of these privileges. It is, of course, only the richer Moslems who can maintain harems; the poorer classes have generally but one wife.

Haren, Onno Zwier van (här′en), a Dutch poet and statesman; born in Leeuwarden, April 2, 1713. An active public man on the Orange side, he was forced into retirement by an obscure scandal after the death of Anne, wife of William IV., and took to literary work. His best production is an epic, "The Fatherland," portraying the Dutch struggle for freedom. His lyric poetry is good; and a tragedy, "William I.," is still generally read. His work on William IV. is a masterpiece of Dutch prose. He died near Wolvega, Friesland, Sept. 2, 1772.

Haren, Willem van, a Dutch poet and statesman, brother of Onno; born in Leeuwarden, Feb. 21, 1710. He held important government posts, but was ruined by speculation. His celebrated poem "Leonidas" (1742) was written to inspire the Hollanders with his own enthusiasm for liberty and the war of the Austrian succession. Even more meritorious are his odes on human happiness and the vicissitudes of life; but his epic poem "Friso," despite imperfections, won him his greatest fame. He died in North Brabant, July 4, 1768.

Hare's Ear (*Bupleurum*), a plant of the natural order *Umbelliferæ*. The most common British species (*B. rotundifolium*) flourishes best on a chalky soil. Under the name of thorough-wax it was at one time used as a vulnerary.

Harfleur (är-fler′) (called in the Middle Ages Hareflot), a town of France, department of Seine-Inférieure; on the estuary of the Seine; 4 miles E. of Havre. Formerly Harfleur was an important seaport and maritime fortress, but the rise of Havre, coupled with the sanding up of its harbor, led to its decay. It was taken after a six weeks' siege by the English under Henry V. in 1415, and during the next 25 years changed hands three times. It was pillaged by the Huguenots in 1562.

Hargraves, Edmund Hammond, the discoverer of the goldfields of Australia; born in Gosport, England, in 1815. When 18 years of age he settled in Australia. Attracted to California in 1849, he there tried his luck as a gold-digger, and while so engaged was greatly struck by the similarity in the geological formation of California and

Australia, and suspected that gold would be found in the latter. On his return home he proved the correctness of his surmise by discovering gold on the W. slopes of the Blue Hills in New South Wales in 1851. He was appointed commissioner of crown-lands, and received from the government of New South Wales a reward of $50,000. In 1855, one year after his return to England, he published "Australia and Its Goldfields." He died in 1891.

Hargreaves, James, an English inventor; born probably in Blackburn, Lancashire, England. He was an illiterate weaver and carpenter of Standhill, near Blackburn. In 1760 he helped Robert Peel in the construction of a carding-machine; and half a dozen years later he invented the spinning-jenny, the idea of which is said to have been suggested to him by seeing a spinning wheel, which one of his children had upset, continue to revolve horizontally while the spindle revolved vertically. But his fellow-spinners, imbued with strong prejudices against machinery, broke into his house and destroyed his frame. He then removed to Nottingham (1767), where he erected a spinning mill. Three years later he took out a patent for his invention; but as it was proved that he had sold some of his machines before the patent was obtained, it was thereby declared to have been invalidated. Hargreaves continued to carry on business as a yarn manufacturer till his death, April 22, 1778.

Hargrove, Robert Kennon, an American clergyman; born in Pickens co., Ala., Sept. 17, 1829; ordained in the Methodist Episcopal Church, South; and held pastorates in Alabama; and was made bishop in 1882. He was for a time Assistant Professor of Mathematics in the University of Alabama, president of Centenary Institute, Alabama, and president of Tennessee Female College. He represented the Methodist Episcopal Church, South, in the Cape May Commission, and in the Committee on Federation in 1898; and had been secretary of the College of Bishops since 1884, president of the trustees of Vanderbilt University since 1889, and of the management of the Epworth League in 1894-1898. He died Sept. 3, 1905.

Häring, Georg Wilhelm Heinrich (hā'-ring), pseudonym WILIBALD ALEXIS, a German novelist; born in Breslau, June 23, 1797. He at first studied law at Berlin and Breslau, but abandoned this pursuit for a literary career. His first success as a writer was the historical romance "Walladmor" (1823–1824), published as a work by Sir Walter Scott, a fraud that found belief and led to the book being translated into several languages (into English, very freely, by De Quincey, 1824). This was followed by "The Outlawed" (1825) and "Castle Avalon" (1827). Häring's subsequent historical romances, the clever character-drawing, historical verisimilitude, and vigorous description of which entitle them to a high rank, are "Cabanis" (1832), "Roland of Berlin" (1840), "The False Woldemar" (1842), "Hans Jürgen and Hans Jochem" (1846), "The Were-Wolf" (1848), "Rest is the Citizen's First Duty" (1854), "Isegrimm" (1854), and "Dorothe" (1856). Besides these, he wrote books of travel, sketches, dramas, and other works. He died in Arnstadt, Thuringia, Dec. 16, 1871.

Hariri Abu Mohammed al Kasim ibn Ali, surnamed AL HARIRI (the silk merchant), an Arabic writer; born in Basra, on the Tigris, in 446 A. H. (1054 A. D.). He wrote valuable works on Arabic grammar, as "Molhat el Irab," a work on syntax, and "Durrat el-Ghawwas," on common faults in current language. But the most famous of his writings, indeed one of the most famous compositions of all times and countries, is his "Makamat" ("Literary Gatherings"). This is a collection of rhymed tales, the central character in which is a certain Abu Seid from Seruj, a witty, clever, amiable rogue, well read in sacred and profane lore, but cunning and unscrupulous, who turns up under all possible disguises and in all possible places. As far as language is concerned, the "Makamat" is looked on in the East as the highest source of authority next to the Koran. The book has been translated, either entirely or partially, into nearly every Eastern and European tongue, and has been the prototype of innumerable imitations, the most successful being one in Hebrew. He died in Basra about 1121.

Hari-Rud (hä-rē-rod'), or **Heri-Rud** (her-ē-), a river of Asia, which rises in the Hindu Kush about 150 miles W. from Kabul, pursues a W. course through Afghanistan for nearly 250 miles; then, bending suddenly to the N. it forms the boundary between Persia and Turkestan, and, after a further course of about 250 miles, loses itself in several arms in the Tekke Turkoman oasis.

Harivansha, a Sanskrit epos, which professes to be part of the Mahâbhârata, but may be more properly classed with the Purânas.

Harlamoff, Alexis, a Russian artist; born in Saratoff in 1844. He studied at St. Petersburg Academy of Fine Arts, gained several medals, became a member of the Academy in 1869, and soon afterward settled in Paris. A regular contributor to the Salon, his portraits and pictures of children and young girls, executed with feel-

ing and painstaking care, rendered him famous.

Harlan, John Marshall, an American jurist; born in Boyle co., Ky., June 1, 1833; was graduated at Centre College in 1850; became a lawyer; served in the Civil War; was attorney-general of Kentucky; a member of the Louisiana Investigation Commission of 1877, and in the same year was made associate justice of the Supreme Court of the United States. In 1892 he was an arbitrator on behalf of the United States before the Bering Sea tribunal.

Harland, Henry, pseudonym SIDNEY LUSKA, an Anglo-American novelist; born in St. Petersburg, Russia, in March, 1861. He removed to London, where he edited the "Yellow Book." He wrote: "As It Was Written" (1885), a musician's story; "Mrs. Peixada" (1886); "The Land of Love" (1887); "My Uncle Florimond" (1888); "The Yoke of the Thorah" (1887); "Mr. Sonnenschein's Inheritance" (1888); "A Latin-Quarter Courtship"; "Comedies and Errors" (1898); "Cardinal's Snuff-box" (1900); etc. He died Dec. 21, 1905.

Harland, Marion. See TERHUNE.

Harlaw, a place 18 miles N. W. of Aberdeen, the site of a battle fought July 24, 1411, between the Highlanders, led by Donald, Lord of the Isles, and the Lowlanders of Mar, Garioch, Buchan, Angus, and Mearns, under Alexander Stewart, Earl of Mar. The battle was long and bloody, but the Highlanders were at last driven back, leaving more than 900 dead on the field. For long after "the red Harlaw" was a favorite theme of legend and song.

Harlay de Sancy, Nicolas, a French diplomatist; born in 1546. He was noted as owner of the Sancy diamond. He died in 1629.

Harlech (här'lech), an ancient town of Merionethshire, North Wales, on the coast, 10 miles N. of Barmouth. On a steep hill overlooking the sea is its massive castle, which held out for the Lancastrians in the Wars of the Roses, and later for Charles I. The "March of the Men of Harlech" commemorates its capture by the Yorkists in 1468. For the Harlech series, see CAMBRIAN SYSTEM.

Harlem, a part of New York city above 106th street. See NEW YORK CITY.

Harlem River, a tidal channel which separates Manhattan Island from the mainland of the State of New York. It communicates with the Hudson river on the W. by means of Spuyten Duyvil creek, and with the East river at Hell Gate. It is about 7 miles long. The Harlem canal, which connects with the East river, was opened June 17, 1895.

Harlequin, a character of the Italian comedy introduced on the stage of other countries. On the Italian stage he is a comic character, full of drolleries, tricks, and knaveries, and somewhat resembles the English clown. The harlequin of British pantomimes is quite different. He is supposed to be a lover of the columbine, and possesses a wonder-working wand with which he protects his mistress against the clown and pantaloon, who pursue and endeavor to capture her, till the pursuit is brought to a termination by a good fairy. The harlequin wears a tight dress of bright colors and glittering with spangles.

Harless, Gottlob Christoph Adolf von, a German theologian; born in Nuremberg, in 1806; was Professor of Theology at Erlangen in 1836, and at Leipsic in 1845. In 1850 he became chief court preacher at Dresden, and exercised great influence on ecclesiastical affairs in Saxony. In 1852 he was appointed president of the Protestant consistory at Munich, and succeeded in making the Lutheran Church in Bavaria strongly orthodox. His most important works were his "Theological Encyclopædia and Methodology" (1837) and "Christian Ethics" (1842). His autobiography appeared as "Bits from the Life of a South-German Theologian" (1879–1875). He died Sept. 5, 1879.

Harley, Robert, Earl of Oxford, an English statesman; born in 1661. After the accession of Anne he and his colleague St. John, afterward Lord Bolingbroke, became leaders of the Tories. Harley was chosen speaker of the House of Commons in 1702 under Rochester, and in 1704 was appointed chief secretary of state, but resigned in 1708. After the fall of Marlborough Harley became chancellor of the exchequer in 1710, and next year was created Earl of Oxford. He and Bolingbroke secured the Treaty of Utrecht (1713), but afterward quarreled. Early in the reign of George I. he was impeached of high treason on the ground of his alleged Jacobite intrigues. He was kept in the tower for two years, but, owing to the inability of the Peers and the Commons to agree about the mode of procedure, he was acquitted. His patronage was extended to Swift, Pope, and other literary men, and he made a valuable collection of books and MSS., which latter are preserved in the British Museum, where they form the Bibliotheca Harleiana. Those which have been printed constitute the Harleian Miscellany. He died in 1724.

Harlingen (här'ling-en), a seaport of the Netherlands, in the province of Friesland, on the Zuider Zee, 14 miles W. by S. from Leeuwarden. It has a good harbor, protected from the sea by dykes. The manufacture of woolen sacks and machines and shipbuilding are the chief industries. But-

ter and cattle are exported to England. Pop. (1900) 10,448.

Harmaline, in chemistry, $C_{13}H_{14}N_2O$, an alkaloid contained in *Peganum harmala*, a plant growing in the Crimea. The seed coating contains harmaline and harmine. They are extracted by dilute sulphuric acid, and then precipitated by a solution of NaCl, in the form of chlorides; the alkaloids may be separated by adding ammonia, the harmine being first precipitated. Harmaline can be converted into harmine by the action of oxidizing agents. Harmaline forms yellow bitter salts.

Harmar, Josiah, an American soldier; born in 1753; served with Washington and Greene in the Revolutionary War; and was general-in-chief of the army in 1789 to 1792. He died in 1813.

Harmattan (här-mat'tan), a dry, hot wind blowing from the interior of Africa to the Atlantic, between Cape Verde, in 14° 43′ N., and Cape Lopez, 0° 36′ S., in December, January, and February. It is generally attended by fog, through which the sun shines red. It hurts vegetation and prejudicially affects man, drying up the eyes, the mouth, etc., even peeling off the skin. On the other hand, it tends to terminate fever and dysentery, and to mitigate cutaneous diseases. It corresponds to the sirocco of Italy, and, to a certain extent, to the Indian and Australian hot wind.

Harmodius and **Aristogiton** (-ji'ton), two Athenians strongly attached to each other, who in 514 B. C. murdered Hipparchus, the younger brother of the tyrant Hippias, partly on account of an insult offered by him to the sister of Harmodius, and partly with a view to the overthrow of the Pisistratidæ. They meant to kill Hippias also, but Harmodius was cut down by the bodyguard of Hipparchus, while Aristogiton fled, but was afterward taken and executed. Subsequently they came to be regarded as patriotic martyrs, and received divine honors from the Athenians, and had statues raised to their memory. A beautiful drinking-song by Callistratus celebrates their deed.

Harmonia, in anatomy, the term employed to denote the simple apposition of comparatively smooth surfaces or edges, as in the case of the two superior maxillary bones. In astronomy, an asteroid, the 40th found. It was discovered by Goldschmidt on March 1, 1856. In classical mythology, a daughter of Mars and Venus, who became the wife of Cadmus. Called also Harmonie and Hermione.

Harmonia, in Greek and Roman mythology, according to some versions, a daughter of Ares and Aphrodite. She became the wife of Cadmus, the founder of Thebes, from whom she received the fatal necklace which brought about the deaths of Amphiraos and Eriphylê.

Harmonic, in mathematics, applied to numbers, terms of certain ratios, proportions, etc., which have certain relations or properties resembling those of musical concords. In music, applied to the sounds produced by a vibrating string or column of air, when it is subdivided into its aliquot parts. Also (1) One of the sounds produced by a vibrating string or column of air, when it is subdivided into its aliquot parts. (2) An artificial tone produced in a stringed instrument (*a*) by varying the point of contact with the bow, or (*b*) by slightly pressing the string at the nodes or divisions of its aliquot parts (½, 1-3, ¼, etc.). In wind instruments, harmonics are produced by varying the intensity of the air current from the mouth. See HARMONY.

Harmonica, a musical instrument formed of a number of glasses which are tuned by filling them more or less with water, and are played by touching them with the dampened finger. The less the quantity of water, the lower is the tone of the scale. The instrument is said to have been invented by a German, and was improved by Benjamin Franklin. Also a small wind instrument. A mouth-organ. At the edge is a series of holes which conduct the breath to free reeds, like those of an accordion.

Harmonica, Chemical, a term applied to the musical note evolved when a long dry tube, open at both ends, is held over a jet of burning hydrogen. A rapid current is produced through the tube, which occasions a flickering, and is attended by a series of small explosions, that succeed each other so rapidly and at such regular intervals as to give rise to a musical note, whose pitch and quality vary with the length, thickness, and diameter of the tube.

Harmonical Proportion, in mathematics the relation between four quantities when the first is to the fourth as the difference between the first and second to the difference between the third and fourth: that is when A : D : : A — B : C — D. So also three quantities are said to be in harmonical proportion when the first is to the second as the difference between the first and second to the difference between the second and third.

Harmonic Engine, an invention in which the energy of an electric current is used, by means of two small electromagnets, to keep up the vibrations of a large and heavily weighted tuning fork. The arms of the tuning fork are connected with two pistons which work a miniature pump, and this may compress air, which, in its turn,

can drive sewing machines or do other light work. The invention is Edison's.

Harmonichord, an instrument played like a pianoforte, but sounding like a violin. The tone is produced by the pressure of the keys, which sets a revolving cylinder of wood, covered with leather and charged with resin, in action over the strings. It has also been called piano-violin, violin-piano, tetrachordon, etc.

Harmonici, the followers of the Pythagorean system of music as opposed to that taught by Aristoxenus. They were also called Musici. The Aristoxenians viewed music as an art governed by appeal to the ear; the Pythagoreans, as a science founded on physical laws.

Harmonicon, an instrument only used as a toy; it consists of free reeds inclosed in a box in such a way that inspiration produces one set of sounds, respiration another. Also a musical instrument consisting of a large barrel organ, containing, in addition to the ordinary pipes, others to imitate the different wind-instruments, and an apparatus to produce the effects of drums, triangles, cymbals, etc., so that the combined sounds produce the effect of a military band.

Harmonic Stop, an organ stop, flute or reed, having its tube twice the normal length, but pierced with a small hole in the middle. Harmonic flute stops are of great purity and brilliancy: they are of eight or four feet pitch. Harmonic piccolos are of two feet pitch. Harmonic reed stops (tromba, tuba, trumpet, etc.) are generally on a high pressure of wind, one of the great advantages of all harmonic stops being that they will take a very strong pressure of wind without overflowing. The fact is, that the harmonic tube, having two synchronous vibrating columns of air, partakes of the nature of a pipe already overblown to its first harmonic, the octave.

Harmoniphon, a small instrument with a key-board, in which the sounds are produced by small metallic tongues acted upon by air blown through a flexible tube. It consists of a series of free reeds similar to those used in the harmonium, placed in a tube shaped like a clarinet. The compass of the instrument is two octaves with intermediate semitones; the keys are arranged in a manner similar to those of a pianoforte, that is to say, all the notes of the normal scale are in one row and the chromatic notes in another.

Harmonists, a sect founded by two brothers, George and Frederick Rapp, who emigrated from Würtemberg to the United States in 1803. Soon afterward they founded the town of Harmony in Pennsylvania. In 1815 they built New Harmony in Indiana. The name of this settlement became celebrated through the place having been purchased in 1823 or 1824 by Robert Owen as a suitable locality for carrying out his views as to the reorganization of society. In 1825 the Harmonists made a new settlement 17 miles from Pittsburg, Pa., which they called Economy. In 1903 they were so reduced in numbers that they sold all their property for $2,500,000 and gave up communal life.

Harmonium, an instrument which bears some affinity to the organ, but, unlike that instrument, is made upon a principle technically termed the free vibrating reed, which is said to have been known from an early period in China, but was invented by Grenié in 1810, and first described by Biot in 1817. The free reed consists of a brass plate containing an oblong slit, having a thin elastic tongue fixed to one end in such a manner, and so exactly fitting into the slit, as to completely close it, but so that it will, upon the pressure of the wind on the free end, pass either inward or outward, without touching the end or sides.

Harmony, a union of sounds which individually appear different, but when heard together form a collective sound called a

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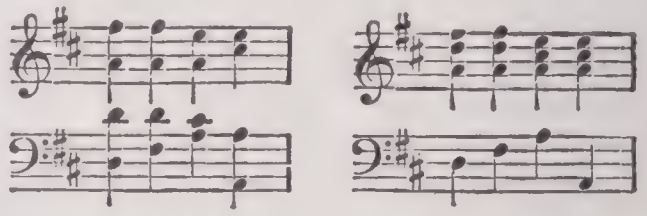

OPEN HARMONY. CLOSE HARMONY.

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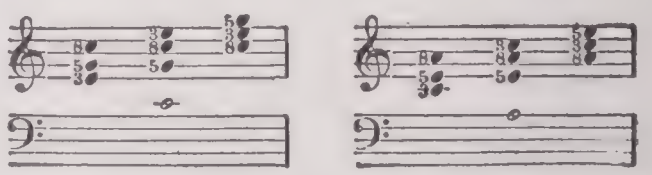


COMMON MAJOR CHORD. COMMON MINOR CHORD.

chord. It may also be explained as the melting or flowing together of several sounds into, as it were, one sound; in consequence of, or arising from, the consonant nature of their relative proportions to a fundamental sound. All musical compositions can be reduced to a fundamental harmony of successive chords, which, in their progression, are regulated by the rules of the theory of music. Dissonant as well as consonant chords are included as forming harmony, as they are a union of several sounds that have but one fundamental sound or bass note in common. The harmony of chords can either be close or open,

which the position or distance of the sounds or intervals from one to another, forming the chords, determines. Close harmony is when the sounds composing each chord are placed so near to each other that no sound belonging to the chord could again be interposed between any of those already present. Open harmony is when the sounds of a chord are placed at a greater distance from each other, so that some of them might be again interposed between the parts of those sounds already present. The common chord of a third, fifth, and octave to a bass note is the most pure and perfect harmony; after which follow the chord of the seventh, and the chord of the ninth. The position of the intervals in respect to the fundamental note is an element in tne purity of chords; therefore harmony, in modern music, is a succession of chords according to certain laws.

Harmony, David B., an American naval officer; born in Easton, Pa., Sept. 3, 1832; entered the navy as a midshipman in 1847, rising through all the grades to that of rear-admiral in 1889. He served brilliantly in the Civil War, and was executive officer of the ironclad "Nahant" in the National operations in Charleston harbor in 1863; was retired in 1893.

Harmost, a name given to those governors of the Greek Islands and towns in Asia Minor sent out into a subject or conquered town by the Lacedæmonians during their supremacy after the Peloponnesian war; the governor of a colony.

Harmotome, in mineralogy, a monoclinic, subtransparent or translucent brittle mineral, occurring in twin crystals; colors white, gray, yellow, red, or brown; streak, white; hardness, 4.5; sp. gr., 2.44–2.45. Composition: Silica, 46.10–48.49; alumina, 15.24–17.65; baryta, 19.12–21.60; water, 13–15.24. It is found in amygdaloid phonolite, trachyte, in gneiss, and in metallic veins. Morvenite is a variety of it.

Harms, Claus, a German divine; born in 1778. His memorial work, "These are Luther's 95 Theses or Controversial Points" (1817), in celebration of the tercentenary of the Reformation, produced a sensation in Germany. He died in 1855.

Harnack, Theodosius, a Lutheran theologian; born in St. Petersburg in 1817. He studied at Dorpat, where he was Professor of Theology from 1848 to 1853, next till 1866 at Erlangen, and again at Dorpat till his retirement in 1873. His principal works are his "Practical Theology" (3 vols. 1877–1882), and "Questions and Explanations to accompany Luther's Small Catechism" (1882). He died in 1889. Of his sons, all of whom attained to distinction, the most famous was ADOLF, born in Dorpat, May 7, 1851, where he studied from 1869 to 1872. He was appointed privatdocent for Church history at Leipsic (1874), extraordinary professor there (1876), and ordinary professor successively at Giessen (1879), Marburg (1886), and Berlin (1888). His chief writings are "Source-Critique of the History of Gnosticism" (Leip. 1873); "The Period of Ignatius and the Chronology of the Antioch Bishops" (Leip. 1878); "Monasticism, its Ideals and its History" (2d ed. Giessen, 1882); "Manual of the History of Dogma" (2 vols. Freiburg, 1886 *et seq.*). In conjunction with Von Gebhardt and Zahn he edited the "Works of the Apostolic Fathers" (3 parts, Leip. 1876–1878); and with Von Gebhardt alone the "Texts and Researches toward a History of Early Christian Literature."

Harney, William Selby, an American military officer; born in Haysboro, Tenn., Aug. 27, 1800; served as colonel in the Mexican War and was brevetted Brigadier-General for gallantry at Cerro Gordo. He was given command of the Department of Oregon, and in 1859 took possession of the island of San Juan, which was claimed by the English. For this he was recalled. He retired in 1863 and was brevetted Major-General in 1865. He died May 9, 1889.

Harney's Peak, the highest point of the Black Hills, South Dakota, named in honor of Gen. W. S. Harney. It is about 7,400 feet high.

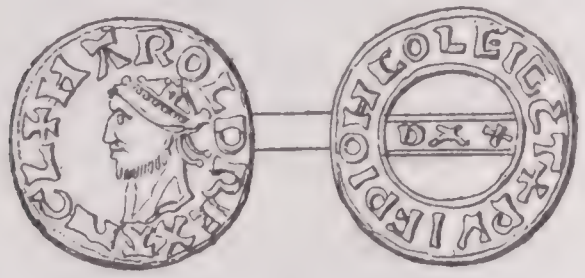
Haro, or **San Juan** (sän hwän') **Archipelago,** a cluster of islets owned by the United States, lying off the S. end of Vancouver Island.

Haro, The Cry of, an old form of appeal in Normandy and the Channel Islands, equivalent to a demand either for protection against bodily harm or for assistance to arrest an adversary. The word was anciently understood to be an appeal to Rolf, Rollo, or Rou, the first Duke of Normandy; a better derivation seems to be from the Old High German *hera* or *hara,* here, making haro simply a cry for aid.

Haroeris, the elder Horus, son of Seb, the Egyptian Saturn, and Nu, or Rhea. He was the brother of Osiris, and he was also lord of the South and Nubia, and particularly ruler over the heaven. He was identified with the sun and Apollo, and represented as hawk-headed, wearing the crown of the upper and lower world.

Harold I., surnamed HAREFOOT, Danish king of England, succeeded his father Canute in 1035 as king of the provinces N. of the Thames, and became king of all England in 1037. His countrymen, the Danes, maintained him upon the throne against the efforts of Earl Godwin in favor of Hardicanute; and Harold latterly gained the earl over. After a reign of four years Harold died in 1040.

Harold II., King of England; born about 1022, was the second son of Godwin, Earl of Kent. On the death of Edward the Confessor, Jan. 5, 1066, he stepped without opposition into the vacant throne, without attending to the claim of Edgar Atheling, or the asserted bequest of Edward in favor of the Duke of Normandy. The latter immediately called upon him to resign the crown, and upon his refusal prepared for invasion. He also instigated Harold's



COIN OF HAROLD II.

brother, Tostig, to infest the N. coasts of England in conjunction with the King of Norway. The united fleet of these chiefs sailed up the Humber and landed a numerous body of men; but at Stamford Bridge, in Yorkshire, were totally routed by Harold, whose brother Tostig fell in the battle. Immediately after he heard of the landing of the Duke of Normandy at Pevensey, in Sussex. Hastening thither with all the troops he could muster, a general engagement ensued at Senlac near Hastings, Oct. 14, 1066, in which Harold was slain, and the crown of England passed to William.

Harold I., surnamed HAARFAGER (Fair-haired), the first king of all Norway. He was the son of Halfdan the Black, the most powerful of the jarls or petty kings of Southeastern Norway. According to the popular story, he loved a high born maiden named Gyda, but she declared she would not be his wife till he was sole king of Norway; he in his turn thereupon took an oath that he would neither cut nor comb his hair till he had accomplished her bidding. After a severe struggle of some years' duration (863–872) he subdued, first the chiefs between Trondhjem and the Sogne Fjord, and finally the kings of the S. W., whom he defeated in a naval battle near Stavanger. The conquered districts he placed under the rule of his own jarls, or such as were devoted to his service. This led many of the old nobles to emigrate to the Orkneys, the Hebrides, and to Iceland, whence they conducted a series of piratical expeditions against Norway, till at length Harold was constrained to sail W. and chastise them in their own seas. In his old age (930) Harold divided his territories among his sons, and he died at Trondhjem, which he had made his capital, about 933, leaving the supreme power to his son Eric, surnamed Bloody-Axe.

Harold III., surnamed HAARDRAADE, or HARDRADA (stern in council), a king of Norway. He was one of the most famous of the old Viking chiefs, and a descendant of Harold I. While still a boy he was present at the battle of Stikklestad (1030), in which his brother, St. Olaf, King of Norway, was slain. Harold himself sought an asylum at the court of his relative, Yaroslaff, Prince of Novgorod. Thence, going on to Constantinople, he became captain of the Varangians or Scandinavian bodyguard of the Greek emperors, and in command of them defeated the Saracens in several battles in Sicily and Italy. On his return to Constantinople he drew upon himself the vengeance of the Empress Zoe, whose proffered love he rejected, and with difficulty made good his escape to Russia, where he married the daughter of Duke Yaroslaff. But he did not remain in Russia. He returned about 1045 to Norway, where his nephew, Magnus (the son of St Olaf), agreed to divide the supreme power with him, in exchange for a share of his treasures. The death of Magnus in 1047 left Harold sole King of Norway, and Svend King of Denmark; but with Svend Harold waged unrelenting war till 1064. This king changed the capital of Norway from Throndhjem to Opslo, now a suburb of Christiania. Two years later he landed in England, to aid Tostig against his brother Harold, King of England, but was slain in battle at Stamford Bridge, where also the flower of his warriors fell.

Haroun (här-ön′), surnamed AL-RASCHID (more properly Harûn er Rashid the orthodox), the most renowned of the Abbaside caliphs; born in 763. He succeeded his elder brother, El Hâdi, in the caliphate, in the year 786. He owed his peaceful accession to the sagacity of the Barmecide Yahya, whom he at once made his grand vizier. To him and his four sons he left the entire administration of his extensive kingdom; and the energy of their administration, the enforcement of order, and the general prosperity of the country proved that his confidence was not misplaced. Meantime Haroun gave himself up to the pleasures of life, and his own taste and hospitality quickly made his court at Bagdad a brilliant center of all the wit, learning, and art of the Moslem world. Himself an accomplished scholar and poet, he gathered round him the best scholars, poets, and musicians of his age, and heaped rewards upon them with lavish prodigality. Toward the end of his reign a strange and deeply rooted hatred toward the Barmecides filled his mind, and in 803 he caused the vizier, his four sons, and all their descend-

ants, save one, to be executed, not even excepting his favorite Jaafer (Giafar), who had been his constant companion in his famous but apocryphal nocturnal rambles through the streets of Bagdad. But the retribution of heaven quickly followed; his affairs fell into irretrievable confusion; treason and rebellion, no longer dreading the far-reaching arm of the able vizier, showed themselves in every corner of the empire; and, when it was too late, Haroun repented bitterly his ferocious cruelty. To quell a formidable rising in Khorassan, in the N. E. of the empire, Haroun marched in person against the rebels, but an attack of apoplexy obliged him to remain behind, in Tûs, where he soon afterward died, in the month of March, 809. Haroun the Magnificent is the hero of many of the stories in the "Arabian Nights," which have thrown a false halo round his memory; for with all his enlightenment, there was room in his heart for the most merciless and bloodthirsty ferocity.

Harp, a stringed instrument of great antiquity. In the Bible, Jubal, a descendant of Cain, is mentioned as its inventor. It was in use among the Egyptians, Assyrians, Hebrews, Greeks, Irish, Welsh, and other nations. The modern instrument is nearly triangular and the strings are extended from the upper part to one of the sides. It stands erect, and is played with both hands, the strings being struck or pulled with both fingers and thumbs. Till the improvements of Erard this form of harp was tuned in the principal key, and modulations effected by pressure of the thumb, or by turning the tuning pins of the strings which it was desired to alter. The instrument, even in its best form, was thus very defective. The frame of the Assyrian harp was about four feet high. The performer held the instrument before his breast and played while standing or walking. It must have been light, as women carried it in processions while singing or dancing. The chief difference from the modern harp consists in the absence of the front pillar, which serves to resist the tension of the strings. It was made partly of metal or ivory, so that it may have had strength to resist considerable tension, and may have been less deficient in sound than might be supposed. The upper portion of the frame contained the sounding board; two sounding holes in shape like an hour glass are to be seen on one side. The tuning pegs are arranged in regular order along the edge of the upper part of the frame, which is united at its base with a horizontal bar, on which the strings running from the tuning pegs are stretched. They are continued below the bar in the form of ornamental tassels which make the instrument appear longer than it really is. The Egyptian harps are found with 4, 7, 10, 20, or more strings. The frames are curved in various forms, the base being generally more strong and solid than the upper part, and the strings are stretched across the wider part of the curve, the tuning pins being on the upper part. The front pillars are wanting.

The trigonon or triangular harp is of a different and more simple description. It has an angular frame, consisting generally of a horizontal and an upright bar, or of a horizontal sounding board with an upright bar between which the strings are stretched. In an instrument found at Thebes in 1823 the strings are stretched from the upper part of a curved frame to a horizontal bar resting on the front and passing through the back of the lower part of the frame. It was mounted with 20 catgut strings, which still sounded when made to vibrate. It had no tuning pegs and was tuned by winding the strings around the horizontal bar. These instruments are properly related to the lyre kind. The most usual number of strings represented on Egyptian harps is seven, which may be held to indicate that the diatonic scale was not in use. The harps of the Hebrews were probably similar to the Assyrian and Egyptian instruments, but there are no representations of them of undisputed accuracy, and it is uncertain which of the names in the Bible describes this instrument. The trigonon and the lyre are almost the only stringed instruments represented in Greek paintings on pottery and monumental records, with the exception of a representation of Polyhymnia with a harp, depicted on a Greek vase that is now in the Munich Museum and dates from the time of Alexander the Great. It is Assyrian in construction, and has 13 strings. The number of tuning pegs does not correspond with that of the strings. Considering that the music of some of the Celtic nations possesses peculiarities which remind us of that of Asiatic nations, and that the earliest harps of the Scotch and Irish with which we are acquainted from old monuments bear a greater resemblance to the Oriental harp than those of a later date, it appears probable that the Oriental harp preceded the European.

The improvements which have rendered the modern harp an efficient musical instrument are due to Sebastian Erard, who in 1794 took out a patent for a harp with seven pedals, and again in 1808 for a double-action harp with the same number of pedals, each of which effects two changes in the pitch of the strings. The harp thus constructed contains 43 strings tuned according to the diatonic scale, every eighth string being a replicate in another octave of the one counted from. Its range is thus six octaves, being from double E below the bass to E in altissimo. It is tuned in the key of C flat, and by fixing the pedals in one groove it is raised to the key of C, while another

change raises them to C sharp. The first of these keys having seven flats, the second seven naturals, and the last seven sharps, a complete succession of semitonic intervals is thus obtained, and the instrument is made capable of rendering the full chromatic scale, and of modulating into all the keys of the tonal system. Each pedal raises or lowers one note of the diatonic scale in all its replicates. Hence, when all the pedals are fixed in the first groove the key of C is produced, as already stated. From this, the normal position in which the harp is set, any pedals may be changed so as to produce the requisite number of sharps or flats. If the key of A is to be played in, for instance, F, C, and G may be sharpened; if E flat is required, B, E, and A may be flattened. The harp being thus set in the principal key required, passing modulations are effected by moving the corresponding pedals with the foot.

Harper, William Rainey, an American educator; born in New Concord, O., July 26, 1856; was graduated at Muskingum College in 1870; Professor of Hebrew at the Baptist Union Theological Seminary, Chicago, in 1879–1886; of Semitic Languages at Yale College in 1886-1891; then president of the University of Chicago. Author of "Elements of Hebrew"; "Elements of Hebrew Syntax"; "Hebrew Vocabularies"; and "An Introductory New Testament, Greek Method" (with Revere F. Weidner); "The Prospects of the Small College"; etc. He died Jan. 10, 1906.

Harper's Ferry, a town in Jefferson Co., W. Va.; at the confluence of the Shenandoah and Potomac rivers, and on the Baltimore and Ohio railroads; 81 miles W. of Baltimore, Md. The place has considerable historical interest. It was the site of a United States government foundry, arsenal and armory, and the scene of John Brown's raid in Virginia in 1859. The government buildings were burned in 1861, to prevent their falling into the hands of the Confederates. In 1862 a Union army under Gen. D. H. Miles surrendered to Stonewall Jackson at this point. It is the seat of Storer College, and has considerable local trade. Pop. (1890) 958; (1900) 896.

Harpings, the planks or wales in a ship, forming her outer skin, which bend in toward the bow, and are fastened in the stern; they hold the timbers of the fore and aft cantbodies till the ship is planked. They are made thicker than other parts of the wales, to encounter the great resistance offered by the water as the ship cuts through it. Cat-harpings, minor ropes between the tops and mastheads, employed to draw the shrouds together and inward toward the mast. They serve to tighten the shrouds, and to give freer play to ply the yards and sails when braced on either tack.

Harpocrates, the Grecian name of the Egyptian god Har-pi-chruti (according to Bunsen and Lepsius) or "Horus, the child," the son of Isis, represented generally as a naked boy sitting on a lotus flower, with his fingers in his mouth, to denote (not, as is commonly supposed, silence), but the childish actions of infancy.

Harpoon, a barbed javelin used to pierce and fasten to whales. It has a broad, flat, sharp head, and a shank about two feet long, furnishing a socket for the shaft. A line about 70 fathoms long is attached to the harpoon, and runs out rapidly as the struck fish dives below the surface.

Harpseal, a Greenland seal. The resemblance to a harp is in two large brown, oblique bands meeting near the shoulders, and then running separately along the sides and up the hind legs, where they become brighter, till they finally disappear in the white of the under parts. The hair is dry, close, and not woolly, except when the animal is very young. It is found in the Arctic Ocean, in Greenland, Newfoundland, Iceland, the N. and N. E. of Asia.

Harpsichord, a stringed instrument with a key-board, similar in form to a modern grand pianoforte, by which it has been superseded. As the pressure of the fingers upon the keys, when heavy or light, made no difference in the quantity of tone produced, the harpsichord sometimes had two key-boards, one for the loud, the other for the soft tones. There were also stops in some instruments, by means of which the tones could be modified by connecting the mechanism with or detaching it from the three, or even four, strings, with which each tone was furnished. The keys were attached to levers, which at their ends had slips of wood, called "jacks," furnished with plectra of crow-quill or hard leather; these struck or twanged the strings, and produced the tone, which has been likened to "a scratch with a sound at the end of it."

Harpy, a fabulous creature in Greek mythology, considered as a minister of the vengeance of the gods. Various accounts are given of the numbers and parentage of the Harpies. Homer mentions but one, Podarge; Hesiod enumerates two, Aëllo and Okypete, daughters of Thaumas by the Oceanid Electra, fair-haired and winged maidens, very swift of flight. Three are sometimes recognized by later writers, who call them variously daughters of Poseidon or of Typhon, and describe them as hideous monsters with wings, of fierce and loathsome aspect, with their faces pale with hunger, living in an atmosphere of filth and stench, and contaminating everything that they approached. The most celebrated tra-

dition regarding the Harpies is connected with the blind Phineus, whose meals they carried off as soon as they were spread for him, a plague from which he was delivered by the Argonauts, on his engaging to join in their quest. The Boreads Zetes and Calais attacked the Harpies, but spared their lives on their promising to cease from molesting Phineus. Vergil locates them in the Strophades. A harpy in heraldry is represented as a vulture with the head and breast of a woman.

The name harpy is also applied to a raptorial bird of the family *Falconidæ* (*Thrasaëtus harpyia*), an inhabitant of the great tropical forests, where it preys upon all quadrupeds except the most powerful, chiefly, however, on monkeys and sloths; even children are said to have been carried off by it. It is somewhat larger than the golden eagle (measuring 38 inches in length as against 32), and its beak and talons are exceptionally large, giving it a ferocious aspect; but its wings are comparatively short, and its flight, for a hawk, is slow and heavy. Its color on the back and sides of the neck, on the back and on the wings, is black; the head gray; the front of the neck, breast, and belly white; the tail black and gray above, black and white in transverse bands below. Around the eyes the feathers are disposed in a radiating fashion, and form a crest on the back of its head, increasing the ferocity of its aspect. It inhabits the tropical regions of South America, from Bolivia and Paraguay to Mexico.

Harraden, Beatrice, an English novelist, daughter of an East India agent in London; born about 1864. After private schooling and a season in Germany she took her degree at London University at 21, showing marked excellence in languages. She was then employed in a publishing house, but ill health compelled her to leave. Her first novel, "Ships that Pass in the Night," was instantly successful. This was followed by "In Varying Moods," "Things will Take a Turn," "Hilda Strafford," a Californian story, "The Fowler," etc.

Harrar. See HARAR.

Harricanaw, a river in the Northwest Territories of Canada; rises in a small lake about lat. 49° 55′ N., lon. 77° 30′ W., and after a N. W. course of about 270 miles falls into James's Bay at Hannah Bay House.

Harrier, a genus of non-arboreal *Falconidæ*, of slender build, with a somewhat weak, unnotched bill, with soft plumage and a slightly owl-like ruff on the face, with long legs and wings, and a characteristic gliding flight along the ground. They live in the open country, are fond of marshy districts, and dexterously catch frogs, birds, and small mammals. The females are usually larger and darker than the males; the young are like the mother birds; the nest is almost always on the ground, and the eggs (3 to 5) are white or blotched. The British species of harrier are (1) the hen harrier (*C. cyaneus*), almost exterminated in England, but still not uncommon in some parts of Scotland; (2) the marsh harrier or moor buzzard (*C. æruginosus*), all but exterminated throughout Great Britain; and (3) Montagu's harrier (*C. cinerascens*), never more than an occasional visitor. The marsh harrier is abundant in many parts of North America.

Harrigan, Edward, an American actor and playwright; born in New York, in 1845. He formed a partnership with Tony Hart (1871–1885), when the two opened in New York their first Theater Comique (1876), bringing out there the "Mulligan Guard" series of plays. Among his dramas, which are all of humble New York life, strong in character drawing, though weak in a literary sense, may be named "Squatter Sovereignty" and "Cordelia's Aspirations."

Harrington, James, an English author; born in January, 1611. Although a republican by conviction, Harrington was appointed one of the personal attendants of Charles I., and on the king's execution accompanied him to the scaffold. It was after this event that his "Oceana" was written; it was published in 1656. The salient points of the political doctrines therein expounded are these: the real basis of power is property, especially landed property; accordingly landed property should be distributed and held in such a way that no one person should derive from it more than a fixed amount of revenue; the rulers of the commonwealth should be changed every three years, their places being taken by others, elected by ballot. After the Restoration Harrington was arrested for alleged conspiracy, and during a severe imprisonment lost his reason. He died in Westminster, Sept. 11, 1677.

Harrington, Mark Walrod, an American astronomer; born in Sycamore, Ill., Aug. 18, 1848. He acquired his education at Evanston, Ill., and the University of Michigan, graduating from the latter in 1868. In 1870–1871 he assisted in the United States Coast and Geodetic Survey of Alaska. From 1879 to 1891 he was Professor of Astronomy and Director of the Observatory at the University of Michigan. In 1884 he founded the "American Meteorological Journal" and was its managing editor until 1892. In 1891 he was appointed Chief of the Weather Bureau at Washington, D. C., where he remained till 1895. He was elected vice-president of

the International Meteorological Conference at Munich in 1895.

Harris, Amanda Bartlett, an American writer; born in Warner, N. H., Aug. 15, 1824. Besides numerous contributions to periodicals, she published many pleasing books, including "How We Went Bird-Nesting"; "Wild Flowers, and where They Grow"; "The Luck of Edenhall"; etc.

Harris, Sir Augustus Glossop, an English actor, manager, and dramatist; born in Paris in 1852. Appearing on the stage in 1873, in 1879 he became lessee and manager of Drury Lane Theater, where he produced popular pantomimes and melodramas written in collaboration — among them: "The World"; "Youth"; "Human Nature"; "Run of Luck"; "Prodigal Daughter"; "Life of Pleasure"; "Derby Winner." He induced the revival of grand opera at Covent Garden. He was made sheriff of London and knighted in 1891. He died in Folkestone, England, Jan. 22, 1896.

Harris, David Bullock, an American military officer; born in Virginia in 1814; was graduated at the United States Military Academy in 1833. In 1861 he entered the Confederate army, attaining the rank of general. He died in 1864.

Harris, George Washington, an American humorist; born in Allegheny co., Pa., in 1814. While a Tennessee river steamboat captain he wrote, about 1860, for the New York "Spirit of the Times," a series of broadly humorous character sketches called "Sut Lovengood's Yarns," published in book form in 1867. He died in 1869.

Harris, Isham Green, an American legislator; born in Tullahoma, Tenn., Feb. 10, 1818. He was admitted to the bar in 1841 and elected to the Legislature in 1847. He was a member of Congress in 1849–1853, and governor of Tennessee in 1857–1863. During the latter part of the Civil War he served as a staff officer in the Confederate army. He subsequently practised law in Memphis, and in 1877 was elected United States Senator, and reëlected in 1883, 1889, 1895. He was unanimously elected president pro tem. of the Senate in 1893. He died July 8, 1897.

Harris, James, an English philologist; born in Salisbury, England, July 20, 1709. Finding himself at 24, on his father's death, master of an ample fortune, he devoted himself to the assiduous study of the classics, but in 1761 he entered Parliament, and later became Lord of the Admiralty, of the Treasury, and secretary and comptroller to Queen Charlotte. In 1751 he published his famous "Hermes," an interesting but scarce profitable inquiry into the philosophical basis of universal grammar. He died in December, 1780.

Harris

Harris, Joel Chandler, an American journalist and story writer; born in Eatonton, Ga., Dec. 8, 1848. He began life as a printer's apprentice, and afterward studied law, drifting finally into journalism. He had a thorough familiarity with the negro of the post-bellum period, and while editing an Atlanta paper he produced for it the series of "Uncle Remus" sketches and songs which immediately made him known.

JOEL CHANDLER HARRIS.

"The Folk-Lore of the Old Plantation" appeared in 1880, followed by "Nights with Uncle Remus" (1883); "Mingo and Other Sketches" (1883); "Daddy Jake, the Runaway" (1889); and a number of poems and essays. In a more serious vein is his biography of the lamented Henry W. Grady, a work of genuine power. He died July 3, 1908.

Harris, Mrs. Miriam (Coles), an American novelist; born in Dosoris, L. I., in 1834. She wrote: "Rutledge" (1860); "The Sutherlands" (1862) — both widely read; "Frank Warrington"; "A Perfect Adonis"; "Missy"; "A Corner of Spain"; etc.

Harris, Robert, a Canadian artist; born in Wales in 1849. His best known work is "Fathers of Confederation," now in the Parliament House, Ottawa.

Harris, Thomas Lake, religious reformer; born in Fenny Stratford, England, May 15, 1823. He accompanied his father to the United States and became a Universalist pastor, and founded an "Independent Christian Society," when in 1850 he was drawn into the spiritualistic movement. He lectured in Great Britain in 1858, and on his return to the United States reorganized his society as the "Brotherhood of the New Life." Property was not held in common, and farming and industrial occupations were engaged in by his followers, numbering at one time about 2,000 in the United States and Great Britain, among them Lady Oliphant and her son, Laurence Oliphant. Harris was again in Europe in 1866. Latterly he settled in California. He published many works in prose and poetry, among which are "Wisdom of Angels" (1856); "Arcana of Chris-

tianity" (1857); "Modern Spiritualism" (1860); etc.

Harris, William Logan, an American clergyman; born in Ohio in 1817; became a Methodist clergyman in early life; and was made bishop in 1872. He died in 1887.

Harris, William Torrey, an American educator; born in North Killingly, Conn., Sept. 10, 1835; studied at Yale College; superintendent of St. Louis public schools in 1867–1880; appointed United States Commissioner of Education, Sept. 13, 1889. He was author of "Introduction to the Study of Philosophy"; "The Spiritual Sense of Dante's Divina Commedia"; "Hegel's Logic: a Critical Exposition"; "Psychologic Foundations of Education"; was also the chief editor of the Appleton School Readers and Appleton's Educational series. He died Nov. 5, 1909.

Harrisburg, a city, capital of the State of Pennsylvania, and county-seat of Dauphin co.; on the Susquehanna river, the Pennsylvania canal, and on the Pennsylvania, the Philadelphia and Reading, the Cumberland Valley, and the Northern Central railroads; 160 miles W. of Philadelphia. It is a railroad center with direct connections with the coal and iron resources of the State, and is an extensive lumber depot.

Public Interests.— The city is well laid out, lighted with electricity, and surrounded by magnificent scenery. The State capitol buildings are located in the midst of a beautiful park of 10 acres on a gentle rise of ground. They are plain brick edifices. The State Library comprises 118,000 volumes, and a monument erected to the memory of the soldiers who fell in the Mexican War adorns the capitol park. Among other points of interest are the State Arsenal, the Court House, Lunatic Asylum, Executive Building, Postoffice, Harris Park, and Harrisburg Cemetery. The educational institutions include the High School, Harrisburg Academy, St. Genevieve's Academy, and the Young Ladies' Seminary. Harrisburg is the seat of a Roman Catholic bishop, and its charitable organizations include several hospitals, the Home of the Friendless, and the Children's Industrial Home. It has electric street railway connections with neighboring towns.

Business Interests.— The iron, steel, and lumber industries are of great importance. The leading manufactures are machinery, malt liquors, boilers, bricks, castings, brooms, cars and coaches, tanned leather, lumber, cotton goods, and flour. Much trade is carried on in butter, hay, and other farm products. In 1891 there were 3 National banks with $500,000 capital and $535,000 surplus, and several private banking houses and building and loan associations. The assessed property valuation in 1901 was $26,000,000; net public debt, $743,393; and the tax rate $17 per $1,000.

History.— Harrisburg was founded by John Harris in 1785; was incorporated as a borough in 1791; became the State capital in 1812; and received its charter as a city in 1860. Pop. (1890) 39,385; (1900) 50,167; (1910) 64,186.

Harrison, a city in Hudson co., N. J., on the Passaic river, opposite Newark, with which it is connected by several bridges; and on the Pennsylvania, the Lackawanna, and the Erie railroads. It has extensive manufactures of cotton thread, electric supplies, wire cloth, harness, trunks, leather goods, steam launches, iron and steel ordnance, and furniture, foundries, breweries, slaughter houses, etc. There are electric lights and street railways, daily and weekly newspapers, public library, high school, and an assessed property valuation of $4,000,000. Pop. (1900) 10,596; (1910) 14,498.

Harrison, Benjamin, an American patriot; born in Berkeley, Va., about 1740. He was elected to the House of Burgesses soon after attaining his majority. In 1773 he was chosen a member of the committee which united the colonies against Great Britain. Shortly afterward he was elected to Congress and five times reëlected. On July 4, 1776, he reported, as chairman of the committee of the whole House, the Declaration of Independence, of which he was one of the signers. He opposed the ratification of the Federal Constitution, but, on its adoption, supported the National government. He died in April, 1791.

Harrison, Benjamin, an American statesman, 23d President of the United States; born in North Bend, O., Aug. 20, 1833. He was a great-grandson of Benjaman Harrison, signer of the Declaration of Independence, and grandson of William Henry Harrison, 9th President of the United States. He was graduated at Miami University; studied law in Cincinnati; removed to Indianapolis, Ind., in 1854, and laid the foundation of a fine legal practice; entered the Union army in 1862, serving with conspicuous gallantry in the Atlanta campaign, finally returning to civil life at the close of the war with the rank of brevet Brigadier-General; was the Republican candidate for governor of Indiana in 1876, but was defeated; was elected to the United States Senate in 1881, where he added to his reputation as a sound thinker and a polished debater; at the Republican Convention held in Chicago, June, 1888, he was nominated for the presidency of the United States; elected in the ensuing November; and inaugurated March 4, 1889. His administration was quiet, successful,

and measurably popular. It was marked by the amicable settlement of the trouble with Chile and by the passage of the McKinley Tariff Bill. In 1892 he received again the nomination in the National Republican Convention, but by this time the able and persistent attacks of the Democracy on the high tariff policy led to a general revulsion against it, and he was defeated at the election by Cleveland. He thereupon pursued a private law practice, occasionally giving public addresses. He died in Indianapolis, Ind., March 13, 1901.

Harrison, Mrs. Burton (Constance Cary), an American novelist and miscellaneous writer; born in Vaucluse, Va., April 25, 1846. She wrote: "Woman's Handiwork in Modern Homes" (1881); "Old-Fashioned Fairy-Book" (1884); "Bar Harbor Days" (1887); and the novels "The Anglomaniacs"; "An Errant Wooing"; "A Bachelor Maid"; "A Son of the Old Dominion" (1897); "A Princess of the Hills" (1901); and a play, "The Unwelcome Mrs. Hatch" (1901).

Harrison, Frederic, an English writer; born in London, Oct. 18, 1831. He was educated at King's College School, London, and Wadham College, Oxford. A Positivist in religion and an advanced Liberal in politics, he argued his opinions in many vigorous and well-written articles in the magazines and reviews, some of which have been reprinted separately. Of his works the chief are "The Meaning of History" (1862); "Order and Progress" (1875); "The Present and the Future" (1880); "Lectures on Education" (1883); "On the Choice of Books" (1886); "Oliver Cromwell" (1888); "The Meaning of History" (1894); "Literary Essays" (1895); and "William the Silent" (1897).

Harrison, James Albert, an American educator; born in Pass Christian, Miss., Aug. 21, 1848; was graduated at the University of Pennsylvania in 1868; Professor of Latin and Modern Languages at Randolph-Macon College, Va., in 1871–1876; of English and Modern Languages at Washington and Lee University in 1876–1895, and of English and Romance Languages at the University of Virginia. He is the author of "Group of Poets and Their Haunts"; "Greek Vignettes"; "Spain in Profile"; "French Syntax"; "History of Spain"; "Story of Greece"; "Antrefois" (Creole Tales); "Dictionary of Anglo-Saxon Poetry"; etc.

Harrison, Jane Ellen, an English lecturer and writer on Greek art and mythology; born in 1850. She began her career as a lecturer in 1882 at the British Museum, and has since extended her work to South Kensington and most of the provincial towns. She has been prominently identified with the university extension movement. Among her publications may be mentioned: "Myths of the Odyssey" (1881); "Introductory Studies in Greek Art" (1885); "Mythology and Monuments of Ancient Athens."

Harrison

Harrison, John, an English inventor; born in Foulby, Yorkshire, England, in 1693. His mechanical genius led him to study the construction of clocks and watches, and by 1726 he had constructed a timekeeper provided with compensating apparatus for correcting errors due to variations of climate. After a long period of persevering labor Harrison made a chronometer which, in a voyage to Jamaica in 1761–1762, was found to determine the longitude within 18 miles. The success of Harrison's chronometer is owing to the application of the compensation curb to the balance wheel; and on the same principle he invented the gridiron pendulum for clocks. He wrote "Description of Such Mechanism as Will Afford a Nice or True Measurement of Times." He died in London, March 24, 1776.

Harrison, Mary St. Leger. See MALET, LUCAS.

Harrison, Robert Alexander, a Canadian jurist; born in Montreal, Canada, Aug. 4, 1833; received a collegiate education; was admitted to the bar in 1855; member of Parliament in 1867–1872; appointed chief-justice of Ontario in 1875. His publications include "Digest of Cases in the Queen's Bench, Upper Canada, from 1823 to 1851" (1853); "Common Law Procedure Act" (1856); "Sketch of the Legal Profession in Upper Canada" (1857); "Rules of Practice and Pleading in the Courts of Upper Canada" (1858); "Municipal Manual of Upper Canada" (1859); etc. He died in Toronto, Canada, in 1878.

Harrison, Thomas, an English patriot; born in Newcastle-under-Lyme in 1606. He joined the parliamentary army at the opening of the Civil War. He commanded the guard that carried the king from Hurst Castle to London, sat among his judges, and signed his death warrant. He did good service at Worcester, but was too uncompromising alike in religion and politics to favor Cromwell's tolerant ideas, and was accordingly deprived of his commission, and later imprisoned for his share in some of the plots hatched by the more irreconcilable bigots. With characteristically stubborn heroism he would not fly at the Restoration, and was soon seized, tried, and condemned to death. He died bravely, Oct. 13, 1660, with the words on his lips, "If I had ten thousand lives, I could freely and cheerfully lay them all down to witness to this matter."

Harrison, Thomas Alexander, an American landscape painter; born in Philadelphia, Jan. 17, 1853. He was a pupil of Gerome in the Ecole des Beaux Arts, and first exhibited in the Salon of 1881. Among his works are "Coast of Brittany"; "Little Slave"; "The Sea-Shore"; "The Wave"; etc. He was awarded the gold medal of honor by the Pennsylvania Academy of Fine Arts in 1894 and in 1898 became an associate National Academician.

Harrison, William Henry, an American statesman, 9th President of the United States; born in Berkeley, Va., Feb. 9, 1773. He served in the Indian War on General Wayne's staff, 1791–1792, and in 1797 was appointed captain, in command of Fort Washington, on the present site of Cincinnati, O. On the conclusion of the war he became Secretary of the Northwest Territory (1798), resigning the next year to enter Congress as delegate from that Territory. In 1801 he was appointed governor of Indian Territory, and made superintendent of Indian Affairs. He made important treaties with the Indians, and won considerable fame by a victory over a force of Indians, in the battle of Tippecanoe, in 1811. In 1812 he was intrusted with full military command on the Northwest frontier, with the rank of Brigadier-General, and the following year was promoted to Major-General. During this year he distinguished himself by his defense of Fort Meigs and in the battle of the Thames. After the War of 1812 he was sent to Congress, 1816; to the Ohio State Senate, 1819; to the United States Senate, 1825; and as United States minister to Colombia, 1828. After a retirement of 12 years he was nominated for the presidency by the Whig party, against Van Buren, in the famous "log-cabin" and "hard cider" campaign. Harrison was said by his opponents to live in a log cabin and to be given to the habit of drinking hard cider. These reproaches were turned into watchwords by the Whigs, and aroused unprecedented enthusiasm. He died April 4, 1841, just a month after his inauguration, leaving the presidency to the Vice-President, John Tyler.

Harrodsburg, a city and county-seat of Mercer co., Ky.; on the Louisville and Southern railroad; 36 miles S. of Frankfort. It is the trade center of a farming and stock-raising section and has manufactures of ice, lumber, and brick. It is the seat of Beaumont College, and a noted health resort on account of the Greenville Springs nearby. The city has daily and weekly newspapers, electric lights, public library, 2 National banks, Harrodsburg Academy, and an assessed property valuation of over $1,000,000. Pop. (1890) 3,230; (1900) 2,876.

Harrogate, an English watering place in Yorkshire. It consists of two parts, High and Low, and is celebrated for its sulphurous saline, and chalybeate springs. Harrogate is a remarkably healthy place, the death-rate per 1,000 ranging in six years between 14.5 and 11.7. Smollett's "Humphrey Clinker" (1771) gives a lively account of Harrogate.

Harrow, or **Harrow=on=the=Hill,** an English town in Middlesex. Its "visible church," which crowns the hill-top, was founded by Lanfranc, and rebuilt about the middle of the 14th century.

Harrow School was founded in 1571 by John Lyon, a wealthy yeoman, who died in 1592; but the original red brick school house (now the Fourth Form School) was not built till 1608–1615. New buildings have been added since 1819, the chief of these being the Second-pointed chapel (1857), the Vaughan Memorial Library (1863), and the semicircular Speech-room (1877). The school was primarily intended to afford a free education to 30 poor boys of the parish; but the statutes, drawn up by the founder two years before his death, provided also for the admission of "so many foreigners as the place can conveniently contain" and it is to that provision that Harrow, though not richly endowed, owes its proud position among the great schools of England. The age of admission is 12 to 14; and there are six or seven entrance scholarships, of from $150 to $400 per annum, offered every Easter. Of leaving scholarships, the most valuable are Baring's three of $500 a year for five years to Hertford College, Oxford. Under the Public Schools Act of 1868 the governing body comprises six members, elected respectively by the Lord Chancellor, the universities of Oxford, Cambridge, and London, the Royal Society, and the undermasters.

Harsha, David Addison, an American religious writer and biographer; born in South Argyle, N. Y., in 1827. He wrote "Lives" of Charles Sumner, Doddridge, Baxter, Bunyan, Addison, James Hervey, Watts, Whitefield, Abraham Booth, and "Eminent Orators and Statesmen" (1855). He died in 1895.

Hart, Albert Bushnell, an American educator; born in Clarksville, Pa., July 1, 1854; became Professor of History at Harvard University. He wrote: "Coercive Powers of the United States Government" (1885); "Introduction to the Study of Federal Government" (1890); "Studies in Education"; "Life of Salmon P. Chase"; "Practical Essays on American Govern-

ment"; etc. He edited "American History Told by Contemporaries" (1898–1901), and, since 1895, the "American Historical Review."

Hart, Charles Henry, an American art critic; born in Philadelphia in 1847. Among his published works are: "Remarks on Tobasco, Mexico"; "Memoirs of William Hickling Prescott"; "Memoirs of William Willis"; "George Ticknor"; "Turner, the Dream Painter"; and "Samuel S. Haldeman."

Hart, Heinrich, a German poet and critic; born in Wesel, Germany, Dec. 30, 1855. His early studies were historical, philosophical, and philological. He became a journalist, a dramatic and literary critic, and one of the leaders of what is known as the naturalistic movement in literature. In collaboration with his brother Julius, he projected a variety of successful periodical publications. His poetical works include a volume of verse; a tragedy, "Sedan"; and an elaborate "Song of Mankind," of which but the first few parts have yet appeared. He has issued a volume of sketches, "Children of the Light."

Hart, Julius, a German poet and prose-writer, brother of Heinrich; born in Münster, April 9, 1859. His earliest efforts were in newspaper dramatic criticisms. Many of his poems have been collected in the volumes "Sansara" and "Homo Sum." He is a graceful translator of poetry from the Persian, English, and Spanish. His poetry and prose are characterized by euphony and limpidity of style.

Hart, Solomon Alexander, an English painter; born in Plymouth in April, 1806. Apprenticed first to a line engraver in 1823, young Hart became a student at the Royal Academy. Among his works are "The Elevation of the Law" (1830); "Isaac of York" (1830); "English Nobility Receiving the Communion" (1831); "Henry I. Receiving Intelligence of the Death of His Son" (1840); "Milton Visiting Galileo in Prison" (1847); "The Three Inventors of Printing" (1852); etc. He also painted miniatures and portraits. He died in London, June 11, 1881.

Hartbeest, in zoölogy, *Alcelaphus caama,* the commonest of the larger antelopes in Southern Africa. It is of a gray-brown color; the dorsal line, a streak on the face, and the outside of the limbs, black; and a large triangular spot on the haunches, whitish. It lives in large herds, and is hunted for its flesh, which resembles that of the ox. It can be domesticated.

Harte, Francis Bret, an American novelist and poet; born in Albany, N. Y., Aug. 25, 1839. He went to California in 1854, and figured as a coal dealer, a teacher, and a typesetter on the "Golden Era," in which appeared some of his earliest literary efforts. He next became editor of the "Californian," and in 1864 secretary to the United States Mint at San Francisco. in 1868 he became editor of the "Overland Monthly," in which appeared, in 1869, the humorous poem of "The Heathen Chinee." In 1878 he was made United States consul at Crefeld, whence he was transferred to Glasgow in 1880, and remained there till 1885. Among his best known works are "The Luck of Roaring Camp"; "The Outcasts of Poker Flat"; "The Argonauts of '49"; "Two Men of Sandy Bar"; "Gabriel Conroy"; "Mrs. Skagg's Husbands"; "East and West Poems" "In the Carquinez Woods"; "Maruja, a Novel"; "Crusade of the Excelsior"; "A Waif of the Plains"; "A Ward of the Golden Gate"; "A Sappho of Green Springs"; "Susy"; "Three Partners"; "Tales of Trail and Town"; "Under the Redwoods"; etc. During the last 24 years of his life Mr. Harte resided abroad, yet through this period he did not lose his keen interest in all that pertained to home. He kept to the literary text which first won him fame. His characters and the scenes in which he placed them continued American and generally Californian to the last. He was a slow, painstaking writer, very methodical in his literary habits. He died near Aldershot, England, May 5, 1902.

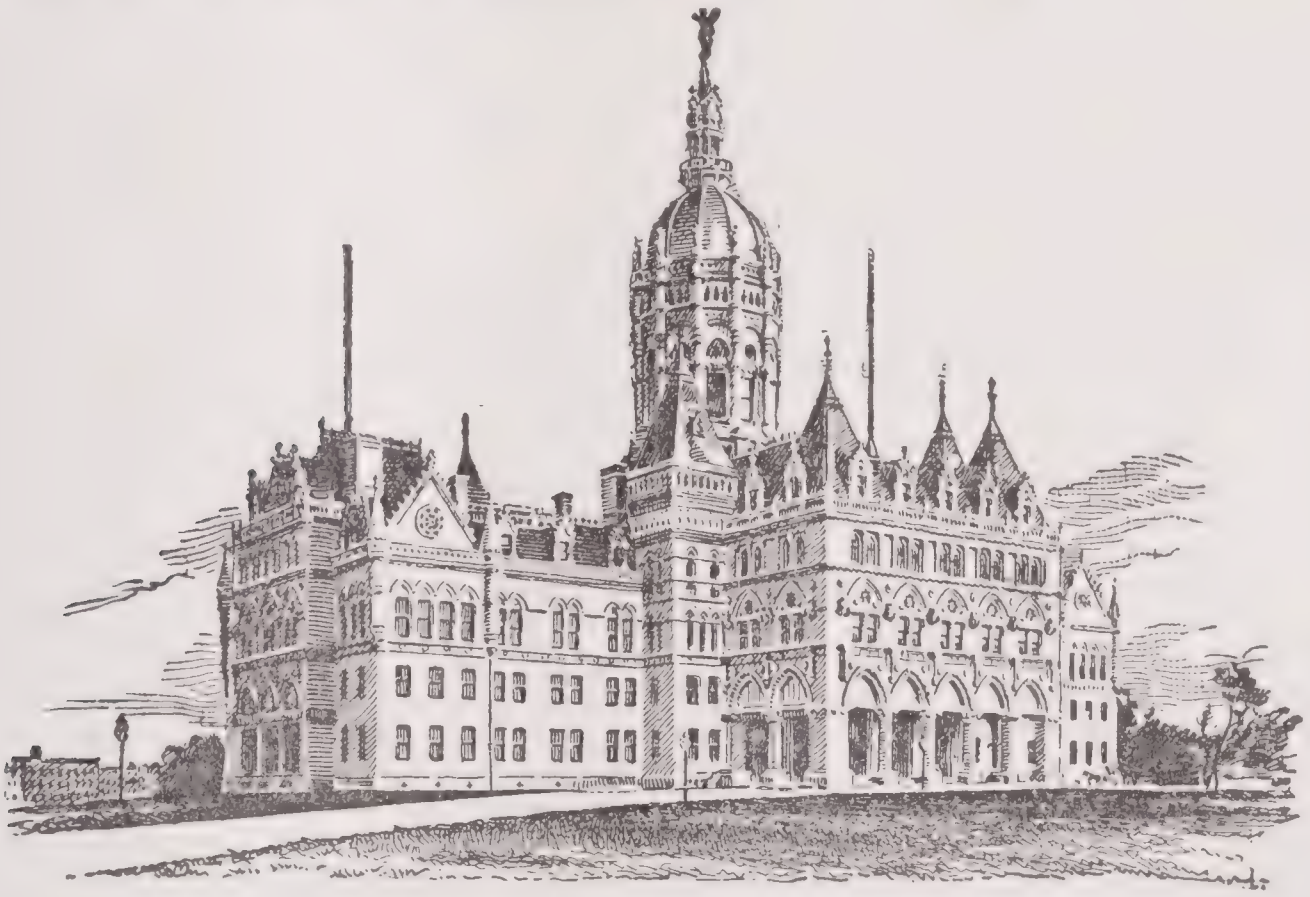
Hartford, a city, capital of the State of Connecticut, port of entry and county-seat of Hartford co.; on the Connecticut river and on the New York, New Haven and Hartford, and the New England and New York railroads; 36 miles N. E. of New Haven. It is an important commercial and manufacturing city, and is noted for its many insurance companies. Area, 17 square miles.

Public Interests.— The city is lighted by electricity, has a waterworks system with 115 miles of mains owned by the city, 115 miles of streets, of which 84 miles are paved, and 89 miles of sewers. It is the seat of Trinity College, Hartford Congregational Theological Seminary, American Asylum for the Deaf, Insane Retreat, Old People's Home, the Wadsworth Atheneum, containing the Connecticut Historical Society, the Hartford Public Library, the Watkinson Reference Library, and the Watkinson Juvenile Asylum. There is a Roman Catholic Cathedral (St. Joseph's), and many elegant churches, a large free public library, and several valuable libraries connected with the educational institutions of the city. The new State House is an imposing structure completed in 1880, at a cost of $3,100,000, having its main approach by way of a bridge over Park river, on which bridge a soldiers' memorial arch has

been built. The old State House, now used as a city hall and the rooms of the Hartford Historical Society, contains many interesting relics and antiquities. The grounds of the new State House and Bushnell Park comprise together a park of 46 acres. Charter Oak Park, on the outskirts of the city, contains the race-course and fair grounds.

Business Interests.— The city's manufactures are varied and extensive, including machinery, tools, firearms, bicycles, carriages, sewing machines, typewriters, nails, boilers, engines, hosiery, brass goods, woolens, tobacco, silver and plated ware, stoneware, etc. In 1900 the capital invested in manufacturing was $30,500,047, and the combined value of such products was $31,-145,715. The exchanges at the United States clearing house during 1900 amounted to $129,316,922. The imports amounted to $1,392,035; the assessed property valuation was $68,842,427; the total public debt $4,-043,228, and the tax rate $17.50.

History.— The first settlement was made by the Dutch in 1623, but it was not till 1636 that a permanent settlement, called Newton, was made by the English. The name was changed to Hartford in 1637. The Dutch were banished from Connecticut in 1654, and in 1687 an attempt was made by the English Governor Andros to seize the Charter, which was thwarted by hiding it in the Charter Oak. The city was incorporated in 1784 and became the State capital in 1873. Pop. (1890) 53,230; (1900) 79,850; (1910) 98,915.



HARTFORD CAPITOL.

Hartford Convention, an assembly of leading New England Federalists which met in Hartford, Conn., in December, 1814, to oppose further prosecution of the war (1812–1814) with England. Among other things which the convention demanded were that the war with England should stop, and that custom house duties collected in New England should be paid to the States within whose borders they were collected, and not to the United States. It declared for changes in the Constitution as follows: Abrogation of the right of Southern States to representation for three-fifths of their slaves; requirement of a two-thirds vote of both Houses for the admission of new States or the prohibition of commercial intercourse or to declare war or to authorize hostilities except in cases of invasion; embargoes to be limited to 60 days; foreigners to be disqualified from all civil offices under the United States; presidents to be ineligible for a second term, and no two successive presidents to be from the same State. Massachusetts and Connecticut sent commissioners to Washington to attempt to carry out the suggestions of the report, but the war had in the meantime ended and the commissioners were ignored. The convention did not meet again; but the odium attaching to it was so great that its president placed a copy of the proceedings in the hands of the Massachusetts Secretary of State in order thus to disprove charges of treason.

Harting, James Edmund, an English naturalist; born in London, April 29, 1841. He matriculated at the University of London in 1859, and followed the profession of a solicitor till 1878, when he retired

and devoted himself to zoölogical research. He was editor of the natural history columns of the "Field," and also had charge of the "Zoölogist." Among his numerous publications are: "The Ornithology of Shakespeare" (1871); "Handbook of British Birds" (1871); "Rambles in Search of Shells" (1875); "British Animals Extinct within Historic Times" (1880); "Essays on Sport and Natural History" (1883); "Bibliography of Falconry" (1891); "Hints on the Management of Hawks"; (1897).

Hartington, Spencer Compton Cavendish, Marquis of; born in 1833, son of the 7th Duke of Devonshire; was educated at Trinity College, Cambridge. He was attached, in 1856, to Earl Granville's Russian mission, and in 1857 was elected one of the members for North Lancashire. In 1863 he became a lord of the admiralty, and was war secretary from 1863 to 1866. In 1868 he lost his seat for North Lancashire, but became postmaster-general under Gladstone, and was returned for the Radnor burghs. In 1871 he was appointed chief secretary for Ireland. He went out with the Gladstone ministry in 1874, and soon after he became the leader of the Liberal party. On the fall of the Conservative government in 1880 he became secretary for India under Gladstone, and was transferred to the war office in 1882. In the general election of 1885 he was returned for the Rossendale division of Lancashire. He strenuously opposed Gladstone's Home Rule Scheme of 1886. In 1891 he became Duke of Devonshire. He died March 24, 1908.

Hartlepool, an English seaport in the county of Durham. It formerly attracted many visitors for sea-bathing during the summer months; but owing to the formation of railways connecting it with the Durham coal mines, it is no longer visited for that purpose. The public institutions include excellent public schools, a public hospital, an ancient parish church, and 13 other places of worship. A substantial seawall and delightful promenade, completed in 1889, have added much to the attractive appearance of the town on the seaward side. Pop. (1901) 22,737.

Hartlepool, West, is situated to the S. as Hartlepool is to the N. of Hartlepool Bay. The first harbor was constructed here in 1847, of 12 acres, and has since been greatly enlarged. The dock area of Hartlepool and West Hartlepool together, including the timber and shipbuilding yards, etc., is over 300 acres in extent. Extensive iron shipbuilding yards, cement works, wood pulp works, and marine engine building establishments have been established. The export of coal from the united port is about 1,500,000 tons annually. Governed from 1854 by a local commission, the town was created a municipal borough in 1887. Pop. of municipal borough (1901) 62,614.

Hartley, David, an English philosopher; born Aug. 30, 1705. He studied at first for the Church, but, dissenting from some points in the Thirty-nine Articles, he abandoned his original intention. His work on the mind, entitled "Observations on Man" (1749), on which his fame rests, was begun when he was about 25, and occupied his thoughts for 16 years. In his mature years he impugned the eternity of hell-punishment, maintaining the ultimate restoration of the lost; in all other points his published opinions coincided with the Church of England, and he continued to the last a member of the Church. He finally chose the profession of medicine, in which he attained considerable eminence. He died in Bath, Aug. 25, 1757.

Hartmann, Eduard von, a German philosopher; born in Berlin, Feb. 23, 1842. At 22 he chose for his life vocation "thinking," or philosophy, and on his retirement from the Prussian military service (1865), devoted himself wholly for some years to writing his great work, "The Philosophy of the Unconscious" (1868). Then followed "The Ethical Consciousness," or as it was at first entitled, "Phenomenology of the Ethical Consciousness" (1879); "The Philosophy of Religion" (2d ed. 1888); and "Æsthetics" (2 vols. 1886–1887). Besides these works, which constitute his exposition of a system of philosophy, he has written: "On the Dialectic Method" (1868); "The Thing in Itself and Its Nature" (1871); "Critical Grounds of Transcendental Realism"; "Elucidations of the Metaphysics of the Unconscious" (1874), afterward styled "New-Kantianism, Schopenhauerism, and Hegelianism"; "Self-Destruction of Christianity, and the Religion of the Future"; "The Crisis of Christianity in Modern Theology" (1880); "Judaism in the Present and the Future" (1885); "Lotze's Philosophy" (1888); "The Ghost Theory in Spiritism" (1891); "The Fundamental Social Questions" (1894); and many other works. He died June 6, 1906.

Hartmann, Moritz, an Austrian poet and agitator; born in Duschnik, Bohemia, Oct. 15, 1821. He was from youth an ardent social reformer, and wrote poems under this inspiration. His "Chalice and Sword" (1845) was distinctly revolutionary. He became a "poet of the people," participated in the movement of 1848, and was elected to the Frankfurt Parliament. His "Poetic Chronicle of Father Mauritius" (1849) attained a wide popularity. He lived in exile for some years, but continued to write poetry and prose in his wan-

derings, his reputation constantly increasing. Deep feeling and love of freedom permeate all his work. He died in Vienna, May 13, 1872.

Hartmann von Aue (-ou'e), a poet of the Middle High German period; born about 1170, of a noble Swabian family, took part in the Crusade of 1187. His writings consist of narrative poems and songs. The most popular of the former is "Poor Henry," based upon a Swabian traditionary story. "Erec," which relates the legend reproduced in Tennyson's "Enid" in "Idylls of the King," and "Iwein," are both drawn from the Arthurian cycle, and closely follow French poems by Christien de Troyes. In "Gregor vom Steine," the plot of which is of a repulsive nature, Hartmann depicts worldly passion subdued and purified by the power of religious faith, the faith of the ascetic of the Church at that date. The songs belong to the erotic class and are marked by freshness and naïveté. His longer works have each been edited several times separately. He died between 1210 and 1220.

Hartranft, Chester David, an American educator; born in Frederick township, Pa., Oct. 15, 1839; was graduated at the University of Pennsylvania in 1861 and at the New Brunswick Theological Seminary in 1864; was pastor of the Dutch Reformed Church in New Brunswick, N. J., in 1860–1878; Professor of Ecclesiastical History at the Hartford Theological Seminary in 1879–1888; and then was elected its president. He is a writer on theological subjects.

Hartranft, John Frederick, an American military officer; born in New Hanover, Pa., Dec. 16, 1830. He was graduated at Union College, Schenectady, in 1853, and in 1860 was admitted to the bar. At the outbreak of the Civil War he proffered his services to Governor Curtin, and remained in active service till the close of the war. In March, 1865, he commanded a division of the 9th Corps in their assault on Fort Steadman, and was brevetted Major-General, executing the sentences of the military commission which tried Mrs. Surratt and others for the murder of Abraham Lincoln; he received the nomination of the Republican Convention in 1865 for auditor-general of Pennsylvania. He was elected at the succeeding election, and was reëlected to the office in 1868. From 1872 to 1878 he was governor of Pennsylvania. He died in Norristown, Pa., Oct. 17, 1889.

Hartshorn, the horn of the common stag, or hart, from which substances deemed of high medical value were formerly prepared by distillation, such as spirits of hartshorn, oil of hartshorn, and volatile salt of hartshorn. It was imported in large quantities from Germany in the form of shavings. The active ingredient of these was ammonia, which is now obtained from gas-liquor and other sources. Hartshorn also yielded a nutritive jelly.

Hart's Tongue, a fern, *Scolopendrium vulgare,* having simple oblong, ligulate fronds, with the base cordate; length 6 to 18 inches; the sori are linear, on opposite contiguous veins, almost confluent. It is found on shady banks and cold and damp situations in various parts of Great Britain, also in continental Europe, in the W. of Asia, Siberia, Japan, and the N. W. of America.

Hartz. See HARZ.

Hartzenbusch, Juan Eugenio, (härtz'-en-bösh), a Spanish dramatic poet of German extraction; born in Madrid, Sept. 6, 1806; studied under the Jesuits, and produced his first book, the drama "The Lovers of Teruel" in 1836. His principal works, all published at Madrid, are the "Doña Mencia" (1838); comedies (1839); and dramatic poems including "Alfonso el Casto" (1841), and others. He also published in prose "Tales and Fables" and "Select Works." His writings are characterized by glowing imagination, vigorous diction, and sonorous versification. Besides his original works he issued good critical editions of the plays of Tirso de Molina, Calderon, and Lope de Vega. During the greater part of his life Hartzenbusch was employed in the national library at Madrid, of which he became director in 1862. He died in Madrid, Aug. 3, 1880.

Harun Al-Raschid. See HAROUN.

Harvard, John, an American clergyman; born in England in 1607. He was graduated at Emmanuel College, Cambridge, England and came to the United States in 1637. He was made a citizen of Massachusetts and given a tract of land in Charlestown, where he began preaching as a Congregational minister, and in his will bequeathed $3,750 and 320 volumes from his library for the establishment of a college. A granite monument was erected over his remains in Charlestown in 1828, and a memorial statue on the Delta at Harvard University was unveiled in 1884. See HARVARD UNIVERSITY.

Harvard Observatory, in Cambridge, Mass., founded in 1843, equipped with a 15-inch Merz & Mahler equatorial in 1847, with an 8¼-inch Troughton & Simms meridian-circle in 1870, with various photometers by Professor Pickering since 1876, and with a large number and variety of photographic telescopes, a part of the largest of them being loaned to the observatory by Mrs. Henry Draper since 1835. It is the richest endowed and in some respects (especially photographically) the best

equipped observatory in the world. It has published 17 quarto volumes of its "Annals." Its successive directors have been W. C. Bond, 1839; G. P. Bond, 1859; Joseph Winlock, 1866; and E. C. Pickering, 1877.

Harvard University, the oldest institution of learning in the United States, founded in Cambridge, Mass., 3 miles from Boston, in 1636. At a meeting of the General Court of the Colony of Massachusetts Bay convened on Sept. 8, only six years after its first settlement, it was voted to give £400 toward a "schoale or colledge," and the ensuing year 12 of the most eminent men of the colony, including John Cotton and John Winthrop, were authorized "to take order for a college at Newtown." The name of Cambridge was soon afterward adopted in recognition of the English University, where many of the colonists had been educated. In 1638 John Harvard, a young non-conformist minister, died in Charlestown, leaving to the college £750 and his entire library of 300 volumes. The institution was immediately opened, and was named after its first benefactor. Its first president was the Rev. Henry Dunster.

Between 1636 and 1782 Harvard College conferred only the degrees of Bachelor and Master of Arts, but in 1780 the term University was applied to it in the constitution of Massachusetts. In 1782 and 1783 three professorships of medicine were established and the first degree of Bachelor in Medicine was conferred in 1788. In 1810 the lectures in medicine were transferred to Boston, and there the first medical college was built in 1815. The Law School was established in 1817, and has the distinction of being the earliest school in the country connected with a university and authorized to confer degrees in law. The Divinity School was a gradual outgrowth of the college: the Hollis professorship of Divinity was established in 1721, but the divinity faculty was not formally organized till 1819. It is undenominational — no assent to the peculiarities of any denomination of Christianity being required of any instructor or student. These were the three oldest additions to the college, and justified the wider title.

The Scientific School instituted in 1847, and at first announced as an advanced school in science and literature, was named after Abbott Lawrence, who presented it with $50,000. It confers the degree of Bachelor of Science. The Graduate School, established in 1872, and placed in 1890, together with the Lawrence Scientific School, under the Faculty of Arts and Sciences, confers also the degrees of Master of Arts, Master of Science, Doctor of Philosophy, and Doctor of Science. The Dental School, situated in Boston, was instituted

Harvard University

in 1867, its course being three years; it gives the degree of Doctor of Dental Medicine. The School of Veterinary Medicine was established in 1882, has a free clinic, a hospital, a pharmacy and shoeing forge, and its course of three years leads to the degree of D. V. M. The Arnold Arboretum was founded in 1872 as the outcome of the will of James Arnold, and is practically a public park of great beauty and an experiment station in Arboriculture, Dendrology and Forestry. The school of Agriculture and Horticulture was established in 1870 in accordance with the will of Benjamin Bussey, and is known as the Bussey Institution. It confers the degree of Bachelor of Agricultural Science. The Astronomical Observatory was established in 1843 by means of a public subscription; the Sears Tier was built in 1846, and two years later Edward Bromfield Phillips bequeathed to the university the sum of $100,000 for the observatory; this early bequest has since been supplemented by many others, so that the observatory now has an endowment of $850,000. It has a director and four other professors and 40 assistants. A branch station is established on a mountain 8,000 feet high, near Arequipa, Peru. The annals of the observatory fill 39 quarto volumes. Among the more important instruments are the 15-inch and 6-inch equatorial telescopes, the 8-inch transit-circle, the 11-inch Draper photographic telescope, the 8-inch photographic telescope, and the meridian photometer.

Among the other establishments belonging to the university are the Museum of Comparative Zoölogy (1850); the Botanical Museum; the Mineralogical Museum; the Natural History Laboratories; the Peabody Museum of American Archæology and Ethnology, founded in 1866 and transferred to the university in 1897; the Semitic Museum founded in 1889; the William Hayes Fogg Art Museum, founded in 1895, and containing among other treasures the Gray engravings and the Randall engravings; the Botanic Garden, founded in 1807, and the Gray Herbarium, presented to the University in 1864; and Radcliffe College, brought into official relation with the university in 1894. Besides the various department libraries, more than a dozen in number, there is a University Library kept in Gore Hall, numbering 379,000 volumes, and as many maps and pamphlets. In 1764 the library was destroyed by fire, the only works saved being an Oriental collection bequeathed by Dr. Lightfoot, and the Greek and Roman classics presented by Bishop Berkley, but now the total number of books amounts to nearly 550,000.

The university buildings number more than 60, including the great Memorial Hall,

built in honor of the alumni who perished in the Civil War. The number of members of the corporation in 1903 was 7; of overseers, 32; of professors, 94; associate professors, 5; assistant professors, 42; lecturers and other instructors, 307; making a total of 448 teachers; 2,073 students in the college; 548 in the Scientific School; 402 in the Graduate School; 52 in the Divinity School; 738 in the Law School; 383 in the Medical School; 115 in the Dental School; 445 in Radcliffe College; and 32 in the Bussey Institution, and a membership of 1,391 in the Summer School of 1903, making a total of 6,179 students connected with the university. Fellowships, scholarships and beneficiaries with stipends, with an aggregate income of $82,000, are used as rewards to deserving students. The invested funds of the university amounted, on July 31, 1903, to $15,863,522, an increase over the preceding year of $1,784,980; the income for the year was $742,413; and the gifts, $1,756,418. The grounds, buildings, scientific apparatus, collections, etc., represented a value of nearly $7,000,000.

The courses of instruction under the Faculty of Arts and Sciences embrace reading and composition in the Oriental, classic, and modern languages, in English, Celtic and Slavic, in history, political economy, government, philosophy, the fine arts, mathematics, engineering, physics, chemistry, botany, zoölogy, geology, mineralogy, mining, metallurgy, archæology and astronomy.

CHARLES W. ELIOT.

Harvest Bug, in zoölogy, *leptus* (formerly called *Acarus*) *autumnalis*. The resemblance to a bug is in its depressed, oval body, its color, and its blood-sucking propensities. It is not, however, a genuine bug; it is a species of the order *Acarina*. In certain years, in autumn, it abounds on grass and other plants. Climbing thence it gets on the person of any one sitting down, or even walking, inserts its sucker into the body, and gorges itself with blood.

Harvest Fly, a name given in the United States to *Cicada septendecim*, a homopterous insect, which appears in Pennsylvania and elsewhere in the United States in incredible numbers once in 17 years. It is erroneously called the seventeen years' locust, the cicadas having no real affinity to the locusts.

Harvest Moon, the moon near its full at the time of harvest, or about the autumnal equinox, when it rises at nearly the same hour for several days, owing to the small angle of the ecliptic and the moon's orbit.

Harvest Mouse, in zoölogy, the *Mus messorius*, a mouse so small that White, of Selborne, who first discriminated it, proposed to call it *M. minimus*, and Pallas *M. minutus*. The body is two and a quarter inches long, the tail two inches. On the back it is of a color like that of the squirrel; beneath it is white with a line between the colors. It is found in harvest, is carried into ricks; it makes a nest of blades of wheat, and brings forth about eight at a litter. Called also *Micromys minutus*.

Harvest Spider, in zoölogy, *Phalangium longĭpes*, the shepherd spider, abounding in autumn, possessing legs of unusual length. When irritated it has the peculiar property of throwing off one or more of its legs.

Harvey, Sir George, a Scotch painter; born near Stirling in February, 1806. He was apprenticed to a bookseller in Stirling, but in 1823 removed to Edinburgh, and entered the Trustees' Academy there. In 1826, when the Royal Scottish Academy was instituted, he was elected an Associate, though only in his 20th year; he became a full Academician in 1829, president in 1864, and was knighted in 1867. Many of his works are well known through the medium of engravings. The principal are "Covenanters' Preaching"; "Battle of Drumclog"; "A Highland Funeral"; "Children Blowing Bubbles in Old Greyfriars' Churchyard"; "First Reading of the Bible in the Crypt of St. Paul's"; "Bunyan in Bedford Gaol"; and "Bunyan and His Daughter Selling Laces"; "Shakespeare Before Sir T. Lucy"; "The Curlers"; and "Leaving the Manse." In his later years Harvey devoted much time to landscape-painting. He died Jan. 22, 1876.

Harvey, Moses, a Canadian historian; born in Armagh, Ireland, March 25, 1820; was graduated at Queen's College, Belfast, in 1840; later studied theology; and was ordained in the Presbyterian Church. He was pastor of Maryport Presbyterian Church, Cumberland, England, for eight years; became pastor of the Free Presbyterian Church, St. John's, Newfoundland, in 1852; remained there till 1878, when he retired from the ministry and devoted his entire time to literary and scientific studies, and became popular as a lecturer. He published "Thoughts on the Poetry and Literature of the Bible" (1853); "The Testimony of Nineveh to the Veracity of the Bible" (1854); "Lectures on the Harmony of Science and Revelation" (1856); "Newfoundland, the Oldest British Colony" (1883); "Text-Book of Newfoundland History"; "Where are We and Whither Tending?" (1886); etc. He also contributed articles to the Encyclopædia Britannica on Newfoundland, St. John's, Labrador, and the seal fisheries of the world; and was a regular contributor to Appleton's "Annual Cyclopædia." In 1873 Mr. Harvey

discovered the devil fish, named *Archetuthis Harveyi*, or *Megalotuthis Harveyi*, which was presented to the Smithsonian Institution, Washington, D. C. He died in St. John's, N. F., Sept. 3, 1901.

Harvey, William, an English physician; born in Folkestone, Kent, April 1, 1578. He took his degree in arts at Caius College, Cambridge, in 1597 and after five years' study at Padua he obtained his diploma as doctor of medicine in 1602. He returned to England in the same year; and after receiving his doctor's degree from his original university, Cambridge, settled in London as a physician. In 1609 he was appointed physician to St. Bartholomew's Hospital, and in 1615 Lumleian Lecturer at the College of Physicians — an office then held for life; and it is generally supposed that in his first course of lectures (in the spring of 1616) he expounded those original and complete

WILLIAM HARVEY.

views of the circulation of the blood with which his name is indelibly associated. It was not till the year 1628 that he gave his views to the world at large, in his celebrated treatise entitled, "Anatomical Study of the Movement of the Heart and the Blood." He was appointed successively physician to James I. and Charles I. To appreciate the importance of Harvey's discovery and the nature of the objections that would be urged against it, it is sufficient to state that Harvey's first step was to prove that the arteries contained not air but blood. The whole course of the circulation could not be demonstrated, as Harvey had no idea of a system of capillaries uniting arteries and veins. He attended the king in his various expeditions, and was present with him at the battle of Edgehill (Oct. 23, 1642). On the surrender of Oxford to the Parliament in July, 1646, he left the university and returned to London. In 1654 he was elected president of the College of Physicians, but he declined the office on account of his age and infirmities. In July, 1656, he resigned his Lumleian lectureship, which he had held for more than 40 years; and in taking leave of the college presented to it his little patrimonial estate at Burmarsh, in Kent. He did not long survive, but, worn out by repeated attacks of gout, died at London, June 3, 1657.

Harwood, Andrew Allen, an American naval officer; born in 1802; entered the navy as a midshipman and rose through the grades to that of rear-admiral, serving in the Civil War. He was an authority on naval courts-martial. He died in 1884.

Harz Mountains (harts), a mountain range of Germany, extending between the rivers Weser and Elbe, S. of Brunswick, with a length of 57 miles, a breadth of 20, and a superficial area of 784 square miles. It forms an elevated plateau, rising on most sides somewhat steeply from the plains, and ridged with irregular and in some parts forest-clad mountains. The range, which is divided into Upper and Lower Harz, the average elevations of which are 2,100 and 1,000 feet, respectively, is composed for the most part of rocks belonging to the Devonian and Lower Carboniferous formations, and broken through in a few places by granite, as in the Brocken, the highest peak (3,740 feet) of central Germany. The Harz are exceedingly rich in metals and minerals, as silver, iron, lead, copper, zinc, marble, alabaster, and granite. These mountains form a natural line of division between the Low German and the High German races. Industries connected with the mines and the forests, as well as some cattle-breeding and agriculture, afford employment to the inhabitants. The rearing of singing birds is also a source of profit. The Harz Mountains are the scenes of many of the weird legendary tales of German literature.

Haschka, Laurenz Leopold (häsh'kä), an Austrian poet; born in Vienna, Sept. 1, 1749. His fame is mainly due to "God Save Emperor Francis," the national hymn of its period, and still an Austrian popular song. He died Aug. 3, 1827.

Hasdrubal (haz'drö-bal), the name of several Carthaginian generals, of whom the most famous was the son-in-law of Hamilcar Barca. In 237 B. C. he accompanied Hamilcar into Spain, and gave that general most effective aid in the work of building up a Carthaginian dominion in the Peninsula. On the death of Hamilcar in 228 B. C. the task of administering and extending the new empire devolved on Hasdrubal, who advanced the Carthaginian frontier from the Bætis (the Guadalquivir) to the

Tagus, and founded a new capital, Nova Carthago (the modern Cartagena), a city with the best harbor on the S. E. coast of Spain, and situated in the vicinity of rich silver mines. Hasdrubal proved himself an admirable administrator. He was remarkably successful in conciliating the Iberian tribes, and extended his rule mainly by peaceful means. So independent was he of the home government that the Romans made a treaty in which the Ebro was fixed on as the frontier line, not with Carthage, but with Hasdrubal. In the eighth year of his command, 221 B. C. he was assassinated by a Celtic slave. Another HASDRUBAL was the son of Hamilcar Barca and the brother of Hannibal. He defeated Cneius Scipio in Spain in 212 B. C., and in 208 marched through Gaul to join his brother Hannibal in Italy. He crossed the Alps in favorable weather, but instead of pushing S. made a fatal delay at Placentia, and was surprised and slain on the Metaurus in 207 B. C. A third HASDRUBAL was one of Hannibal's principal officers in the Italian campaigns. He made a brilliant charge at the battle of Cannæ, which contributed greatly to decide the fate of the day. A fourth general of the same name defended Carthage against the Romans during the siege which ended in the city's destruction in 146 B. C. He is accused of cowardice and cruelty, and of having starved the citizens while himself living in revelry.

Hase, Karl August von (häs'uh), a German theologian; born in Steinbach, Saxony, Aug. 25, 1800. After being expelled from Erlangen University for his connection with the political students' unions, he became in 1823 a university tutor at Tübingen, but after a new investigation was imprisoned for 10 months in the fortress of Hohenasperg. He settled at Leipsic in 1829, and in the following year was called to Jena as Professor of Theology. Here he remained till his retirement in 1883, when, after 60 years of teaching, he was ennobled, and appointed a privy-councillor. His chief writings are "The Old Preacher's Testament" (1824); "Manual of Evangelical Dogma" (1826); "Gnosis" (3 vols. 1826–1828); "Hutter Revived" (1828), which was an able attempt to present dogmatic theology in the form that Hutter would have chosen had he been living in the 19th century, and involved him in a long controversy with Röhr, the exponent of "vulgar-rationalism"; "Life of Jesus" (1829); "Church History" (1834); a life of St. Francis (1856); a handbook of Protestant polemical theology (1863); a life of St. Catharine of Siena (1864); and lectures on Church history (1880). He subsequently began the publication of a Church history based on his university lectures (1885 *et seq.*). His autobiography down to 1830 is entitled "Ideals and Errors" (1872). Hase was called the Nestor of modern scientific theology. He did great service in the reconciliation of the Church's faith to modern thought, and was an equally resolute and effective opponent of orthodoxy on the one hand and rationalism on the other. He died Jan. 3, 1890.

Hashish (hash'ēsh), an intoxicating preparation made in Eastern countries from common hemp (*Cannabis sativa*), or rather from the Indian variety of it (*Cannabis indica*); also a name for this plant itself or for its tender shoots. The juice of the plant has powerful narcotic properties, and is variously made use of. A resin which the plant gives out is often gathered and kneaded and formed into small balls called churrus, and from this a narcotic is prepared. It has the appearance of a tenacious ointment of a greenish-yellow color, with an acrid savor and a nauseous smell. Hashish produces a kind of intoxication, accompanied with ecstasies and hallucinations. When dried and smoked as tobacco the plant is called bhang; or this name is given to a drink prepared from the leaves and shoots. Ganja or gunja is the dried shoots of the female plant with the resin on them. Hashish in several forms is employed in medicine.

Haslar Hospital, an English institution, to the S. of Gosport, England, between Haslar Lake and the sea, is an enormous establishment for the officers and men of the navy, dating from 1746, and capable of accommodating 2,000 patients. The Royal Naval Chapel is also here, and beyond are the Haslar barracks.

Hassan Pasha (has-an' pash-ä'), a grand vizier of the Ottoman empire; born about 1703. He entered the Turkish service, distinguished himself, and was appointed capitan pasha, or high admiral. He vanquished the Egyptian insurgents, took Gaza, Jaffa, and Acre; and beheaded the famous Daher, sheik of the latter city, who had for years defied the power of the Porte. He twice reduced the beys of Egypt to subjection, and carried with him vast treasures to Constantinople. In the war between Turkey and Russia in 1788 he was appointed to the supreme command of all the forces, and made grand vizier; but though there was no want of energy on his part, age had impaired his abilities, and the Ottoman forces were subjected to repeated discomfiture. The vizier was accordingly put to death in 1790.

Hassan-ben-Sabah (-ben-sab-ä'), the "Old Man of the Mountain" of European story, was the founder of the Moslem sect of the Assassins.

Hassard, John Rose Greene, an American musical critic; born in New York, Sept. 4, 1836. He was for many years on the staff of the New York "Tribune" as an authoritative musical critic. His most important work is "The Ring of the Nibelung"; but he also achieved distinction with such books as "Life of Archbishop Hughes"; "Life of Pope Pius IX."; "A Pickwickian Pilgrimage"; etc. He died in New York city, April 18, 1888.

Hassaurek, Friedrich (häs'sour"ek), an Austrian-American author; born in Vienna, Oct. 9, 1832. As a boy he was a volunteer soldier in the Austrian army in 1848, but came to the United States the next year, and was long a journalist in Cincinnati. He was United States minister to Ecuador under Lincoln. "Four Years Among the South Americans," a volume of sketches; "The Secret of the Andes," a novel; and a collection of verses written in German, are his remembered works. He died in Paris, Oct. 3, 1885.

Hasse, Johann Adolf (häs'uh), a German composer; born near Hamburg, March 25, 1699. He became famous as "the Saxon" through his opera "Sesostris," produced at Naples (1725); was kapell-meister at Dresden; and was brought to London in 1733 to head an opposition to Handel as representing the Italian school. Here "Artaxerxes" was produced with success; but Hasse soon left London, and in 1740 was in Dresden, subsequently retiring to Vienna and to Venice, where he died, Dec. 23, 1783.

Hasselt, capital of the Belgian province of Limburg, 18 miles N. W. of Maastricht, has several distilleries, manufactures linen fabrics, lace, and tobacco, and cultivates tobacco, madder, and chicory. In 1831 the Dutch defeated the Belgians here.

Hasselt, André Henri Constant van (häs'selt), a Belgian historian; born in Maastricht, Holland, Jan. 5, 1806. As a naturalized Belgian he early made that country his own from a literary point of view, and became in 1837 a member of the Belgian Academy. His leading historical works are: "History of French Poetry in Belgium"; "The Belgians in the Crusades"; "History of the Belgian People"; and "The Glories of Art in Belgium." He also produced a variety of verses, stories, and essays. His poems are highly spoken of, especially the one entitled "Four Incarnations of Christ." He died in Brussels, Nov. 30, 1874.

Hastati, one of the three grand divisions of the Roman infantry, so called because they were armed with spears. It consisted of young men in the flower of life, who were always drawn up in the first line of battle. The other two divisions were called principes and triarii, to which was added another, called volites, or light troops.

Hastinapur (häs"tēn-ä'pör), a ruined city of India, on the old bed of the Ganges, 22 miles E. of Meerut. It was the capital of the great Pandava kingdom, frequently mentioned in the Mahâbhârata.

Hastings, a maritime town of England, in Sussex, 54 miles S. E. of London. It had formerly a good trade, now declining, but is resorted to as a fashionable watering place. Here the battle of Hastings, one of the most memorable events in the annals of English history, was fought between William, Duke of Normandy, and Harold II., King of England, on Oct. 14, 1066.

Hastings, a city in Adams co., Neb.; on the Burlington Route, the Fremont, Elkhorn, and Missouri Valley, the St. Joseph and Grand Island, and the Missouri Pacific railroads; 96 miles W. of Lincoln. It is the seat of Hastings College, the Chronic Insane Asylum, and the Bethany Home and Hospital. It is an important grain shipping center and has vinegar works, foundries, flour mills, and other manufacturing industries. There are electric lights, waterworks, public library, high school, daily and weekly newspapers, 3 National banks, and an assessed property valuation of $700,000. Pop. (1900) 7,188; (1910) 9,338.

Hastings, Francis Rawdon, Marquis of, Governor-general of India, born in 1754. Having studied at Oxford, he entered (1771) the 15th Foot. From 1776 to 1782 he served with distinction in the American Revolutionary War. In 1793 he became Earl of Moira, and in 1795 commanded the expedition to Quiberon. From 1813 to 1823 he was governor-general of India, and was successful in the Nepaulese and Mahratta wars. In his latter years he was governor of Malta. He died in 1825.

Hastings, Warren, first Governor-general of India; born in Daylesford, Worcestershire, in 1732. He was educated at Westminster School, and in 1750 he set out for Bengal in the capacity of a writer in the service of the East India Company. When stationed at Cossimbazar he was taken prisoner by Surajah Dowlah on the capture of the place (1756). Having made his escape, he served as a volunteer under Clive in 1757. He was representative of the company at Moorshedabad from 1758 to 1761. In the latter year he removed to Calcutta, having obtained a seat in the Bengal Council, but returned to England in 1764. As he lost the bulk of his means by unfortunate Indian investments, he again entered the company' service, and sailed for India in 1769. In consequence

of the misgovernment of the Nabob of Bengal the company had deprived him of all real power, and now wished to have the country more directly under their control. Warren Hastings was its chief instrument in this undertaking, and in 1772 became president of the Supreme Council of Calcutta.

Mohammed Reza Khan, the administrator of the revenues of Bengal, was now accused by an unprincipled character named Nuncomar of corruption and abuses of power. In this prosecution Hastings acted as the tool of the company. Mohammed and Shitab Roy, dewan of Behar (who had been similarly accused), were afterward honorably acquitted, but meantime the reorganization desired by the company had been carried out. In 1773 the company's powers were considerably modified and Hastings now received the title of Governor-general of India. As the majority of the Council disapproved of Hastings's past policy, Nuncomar, his old ally, took advantage of the circumstance to accuse him of peculation (1776). The accusations were favorably received by the Council, when Nuncomar was suddenly accused by a Calcutta merchant (acting probably on the instigation of Hastings) of forgery, tried, and executed. In 1776 the directors of the company petitioned for his removal from the Council, but Hastings resigned, and a successor to him was appointed. In 1777 one of the members of the Council died, and Hastings, having thus procured a casting vote, withdrew his resignation, and returned to office.

He now displayed extraordinary resource in meeting dangerous movements on the part of the Mahrattas, the Nizam of the Deccan, and Hyder Ali of Mysore, and to procure the needful money was less than scrupulous in his treatment of the rulers of Benares and Oude. He thus gave good grounds for censure, and a motion for his recall was passed in the House of Commons. Fox's India Bill was thrown out in 1783, but next year Pitt's bill, establishing the board of control, passed, and Hastings resigned. He left India in 1785, and was impeached by Burke in 1786, being charged with acts of injustice and oppression, with maladministration, receiving of bribes, etc. This celebrated trial, in which Burke, Fox, and Sheridan thundered against him, began in 1788, and terminated in 1795 with his acquittal, but cost him his fortune. The company in 1796 settled on him an annuity of $20,000 a year, and lent him $250,000 for 18 years free of interest. He passed the remainder of his life in retirement at Daylesford, which he purchased. He died in 1818.

Hastings Sands, named from Hastings in Sussex, England, is the lower division of the Wealden beds, forming a portion of the Lower Cretaceous series. The beds consist chiefly of sand and sandstone with subordinate layers of clay, and vary in thickness from 500 to 1,000 feet. The group embraces three members which, in descending order, are as follows: Tunbridge Wells Sand, Wadhurst Clay, Ashdown Sand.

Hat, the principal head covering of the human family, distinguished from the cap or bonnet by having a brim around it. The hat, as a roomy brimmed head-covering, is the direct descendant of the petasus of the ancient Greeks, which was distinguished from the other Greek head-gear, the pileus, by the possession of a brim, useful for protecting its wearer from the rays of the sun. These Greek hats were made of felt, the material of which the head-gear of early times appears to have been principally fabricated.

Hats were made first in Paris by a Swiss in 1404. When Charles VII. made his triumphal entry into Rouen in 1449 he wore a hat lined with red velvet with a rich plume of feathers, and hats were thenceforth the fashion of France.

The use of felted hats became known in England about the period of the Norman conquest. The merchant in Chaucer's Prologue to the "Canterbury Tales" is described as having "on his hed a flaundrish bever hat." About the period of Queen Elizabeth beaver felts in many shapes became common, and for three centuries thereafter fine beaver hats, mostly dyed black, formed the head covering of the higher classes in Great Britain. But now, though felt hats are the everyday wear of the community, there is no longer such a thing as a genuine beaver hat.

Hats at the present day are fashioned of an endless variety of materials, and, especially in the case of those worn by ladies, they are so diversified in form that they defy all definition. But with all their variations three principal classes of hat manufacture may be distinguished, comprised under the felt hat, the silk hat, and the straw hat trades. In the felt hat trade, the materials now principally employed are the fur or hair of rabbits, with smaller proportions of hare, beaver, musk-rat, vicuna, and camel for the finer felts; and sheep's wool for the commoner felted hats. Felt hats of inferior quality are also made with wool mixed with cotton and other vegetable fibers — not in reality felted, but cemented by varnish which is used at once to hold together the fibers and to stiffen the hat body. In the felting of rabbit, hare, and other furs, a "bat" is first formed, which consists of an expanded cone of equally distributed fibers in quantity sufficient to form the desired hat. To make this "bat" a perforated cone

of sheet copper is caused to revolve slowly over a funnel under which there is a powerful blast drawing air inwards through the holes in the copper cone. Fur is fed toward and drawn over the surface of the cone in an equal manner by the suction, and is so held in position till a sufficient quantity to form the hat is uniformly distributed over it. A wet cloth is then wrapped around the mass, over which an outer cone is slipped, and the whole then dipped into an acidulated bath of hot water, and by pressure the first stage of felting — making the bat cohere — is secured. The subsequent operations are the same in making both fur and woolen felts. In the felting of wool for hats the bat is formed from carded wool wound diagonally round a double cone, which gives two bats. These are subjected to the usual operations of felting till a sufficient consistency of felt is obtained. The hats are thereafter roughly blocked on a mold to something of their ultimate form, then dyed, and when hard felts are to be made they are stiffened with a varnish of shellac. They are then shaped on a block, smoothed with sand-paper, bound, lined, and finished.

The manufacture of silk hats as a substitute for piled beavers was first attempted about 1810, but it was not till 1830 that silk plush hats were successfully made. The silk hat consists of a body and rim, usually made of two or three layers of cotton cloth saturated with varnishes, to give the fabric stiffness and make it waterproof. These are molded on wooden blocks according to the fashion of the day; and when the desired shape is produced the whole is carefully varnished over with lac and dammar varnish, and before dry the fine silk plush is applied with great nicety, so as to prevent the seams being perceived. It is then trimmed with silk braid on the edge of the brim, and a silken band round the junction of the body with the brim; and the lining of leather and thin silk being put in, it is complete. Opera hats or crush hats consist of a covering of merino stretched over a spiral steel frame, which by pressure flattens down, so that they can be easily carried.

The manufacture of straw hats forms an entirely distinct branch of the hat trade. See Straw Plait.

Hatch, John Porter, an American military officer; born in Oswego, N. Y., Jan. 29, 1822; was graduated at the United States Military Academy, and appointed 2d lieutenant of infantry, 1845, rising through successive grades to lieutenant-colonel of cavalry 1873; in the Mexican War took part in various engagements from Palo Alto to the capture of the city of Mexico; subsequently in garrison and on frontier duty; in the Civil War was appointed Brigadier-General of volunteers Sept., 1861, and commanded a cavalry brigade in the Shenandoah Valley and Northern Virginia; at the battle of South Mountain, Sept. 14, 1862, commanded a division; subsequently commanded various districts in the South; and was brevetted Major-General. He died April 12, 1901.

Hatchee, or Hatchie, a river, rising in Tippah co., Miss., passes through part of Tennessee, and enters the Mississippi river near Randolph. An action occurred at Davies's Bridge on this river, Oct. 6, 1862, between a Confederate force under General Van Dorn, and one of National troops under General Ord, in which the former were defeated with the loss of 300 prisoners and two batteries. Ord and Veatch were wounded during this battle.

Hatchery, a house for hatching fish, etc. Since the government undertook to stock lakes and rivers in the United States with fish, many hatcheries have been constructed in different parts of the country. They are under the supervision of the fish commissioners.

Hatchettine. See Mineral Tallow.

Hatching, in engraving, a term applied to a series of lines placed closely side by side, to produce the effect of a uniform tint in engraving, and laid on by the strokes of the crayon or graver at angles more or less acute according to the degree of shadow. It is also used to produce some of the shadows in fresco painting, and in miniature it is very effective when well executed. Often called cross hatching.

Hathamite, an explosive invented in 1902 by Prof. H. M. Hathaway, of Wellsboro, Pa. Its safety features have been demonstrated by pounding the explosive on an anvil until the sparks flew, throwing it on burning fire, and placing it in a tin box and firing rifle bullets through it. The explosion can only take place when a dynamite percussion cap is used. Some of the explosive was next frozen into a cake of ice and exploded. Circular pieces two inches in diameter were blown from 3-16 inch boiler plate, cutting the plate clean, 1¼ ounces of the explosive being simply placed on the plate and detonated in the open air. A one-pound regulation army shell was exploded within a receptacle, and the shell was blown into a thousand pieces.

Hattemists, a sect which sprung up in Holland in the 17th century. Hattem is said to have denied that the death of Christ was an expiatory sacrifice, and affirmed that in his teaching he simply signified to us that there was nothing in us which could offend God, and in this way he made us just. Also that God punishes men by their sins, not for their sins. The sect afterward discarded the first name of Hattemists.

Hatteras, Cape, a low point of North Carolina, forming part of a sandbank, in lat. 35° 15′ N. and lon. 75° 31′ W. The coast line here turns from the direction of N. E. to that of due N.; violent storms are frequent, and render navigation dangerous and the island is marked by a light raised 190 feet above the sea.

Hatti-humayun, or **Khatti-humayun,** an edict, being a few words in the Sultan's handwriting, commanding it to be put in execution (*Catafago*). Humayun is Arabic for blessed. The term hatti-humayun is occasionally used in connection with the Sultan's decrees regarding the rights of his Christian subjects.

Hatti-scheriff, a decree emanating directly from the Sultan of Turkey, and subscribed with these or similar words, "Let my order be executed according to its form and import." These words are usually written in ornamented characters. A hatti-scheriff differs from a firman in being irrevocable. Scheriff is Turkish, from Arabic sharif, meaning great, grand, magnificent, illustrious. A hatti-scheriff was sent forth on June 6, 1853, confirming the rights of the Greek Christians.

Hatton, Frank, an American journalist; born in Cambridge, O., April 28, 1846; entered journalism young; served through the Civil War in the Army of the Cumberland, being commissioned 1st lieutenant in 1864; after the war returned to journalism, first in Mt. Pleasant, Ia., then as partner with Robert J. Burdette in the proprietorship of the Burlington "Hawkeye"; appointed by President Arthur Assistant Postmaster-General (1881–1884); Postmaster-General (1884–1885); editor of Chicago "Mail" (1884–1888); editor of Washington "Post" (1888–1894); and died in Washington, D. C., April 30, 1894.

Hatton, Joseph, an English journalist; born in Andover, Feb. 3, 1841. Beginning journalism on his father's paper, the Derbyshire "Times," he edited the "Gentleman's Magazine" (1868–1874); and became a newspaper correspondent (particularly for the New York "Times") and magazinist. As a novelist he will be remembered for "Clytie" (1874); "Queen of Bohemia" (1877); "John Needham's Double" (1885), dramatized for E. S. Willard; "By Order of the Czar," a novel of Russian life; "Princess Mazaroff"; "Under the Great Seal"; "When Greek Meets Greek," a novel of the French Revolution successfully dramatized; "When Rogues Fall Out" (1899), etc. Among his miscellaneous publications the best known are: "Journalistic London"; "The New Ceylon"; "Henry Irving's Impressions of America"; "Reminiscences of J. L. Toole, Comedian." He died July 31, 1907.

Hauberk, a piece of armor, supposed to be of German origin, common in the chain mail or rather ringed mail of the 12th century; being a jacket or tunic, with wide sleeves reaching a little below the elbow, the hood being of one piece with it. The hauberk of ringed mail ceased to be worn about the reign of Henry III. of England, when the Oriental chain mail properly so called came into fashion for a short period. In France, only persons possessed of a certain estate called *un fief de hauber*, were permitted to wear a hauberk, which was the armor of a knight; esquires wore only a simple coat of mail without the hood and hose.

Hauch, Hans Carsten (hou*h*), a Danish poet; born in Frederikshald, Norway, May 12, 1790. In 1846, he was appointed to the chair of Northern Literature in the University of Kiel. Two years later the Holstein revolution drove him back to Copenhagen; and on the death of his friend Oehlenschläger, in 1850, he succeeded him in the chair of Æsthetics at the university there, and held it till his death. Hauch's riper and more successful works embrace nine historical tragedies, all written between 1828 and 1850, in which he exhibits great powers of individualizing character and portraying the local coloring of his scenes; "Lyric Poems" (1842, 1862, and 1869), some of which are extremely beautiful and enjoy an undisputed popularity in Denmark; and many tales and romances, etc. His epic-dramatic poem "Hamadryads" (1830) met with warm appreciation in Germany. He died in Rome, March 4, 1872.

Hauck, Minnie, an American opera singer; born in New York city Nov. 16, 1852. Her first appearance was in concert in New Orleans when only 13 years old. She afterward studied with Errani in New York and made her operatic début in "La Sonnambula" in 1868. She has been uniformly successful both in the United States and European countries. She married the Chevalier de Hesse-Wartegg.

Hauenschied, Richard George Speller von. See WALDAU, MAX.

Hauerite (hou′er-īt), an isometric metallic-looking mineral, generally crystallizing in octahedrons, though sometimes in globular clusters. Color red-dirt-brown, or brownish-black, luster somewhat adamantine. Composition: Sulphur, 53.7; manganese, 46.3 = 100. Found at Kalinka in Hungary.

Haufa. See ABA.

Hauff, Wilhelm, a German story-writer; born in Stuttgart, Nov. 29, 1802. From the monastery at Blaubeuren, he went to

Tübingen to study theology, but became tutor in the family of a high official. His works include: "Almanach of Fables for 1826"; "Extracts from Satan's Memoirs"; "Lichtenstein"; "Othello"; "The Beggar of the Pont des Arts"; and a medley of the most fascinating and amusing tales. His most delightful creation is "Phantasies of the Bremen Rathskeller," in which his fertility of resource and sparkling wit seem unfailing. He died in Stuttgart, Oct. 18, 1827.

WILHELM HAUFF.

Haug, Johann Christoph Friedrich, a German poet; born in Niederstotzingen, Würtemberg, March 9, 1761. His fame dates from the appearance of two books: "Epigrams and Miscellaneous Poems," and "Epigrams." A fine example of his ever juvenescent wit is "Two Hundred Hyperboles upon Herr Wahl's Enormous Nose." He wrote also fables, ballads, and charades, in smooth and elegant meter. He died in Stuttgart, Jan. 30, 1829.

Haupt, Paul (houpt), an American educator; born in Görlitz, Germany, Nov. 25, 1858; was graduated at the Gymnasium Augustum, Görlitz, in 1876, and studied in the University of Berlin and in the British Museum; accepted the chair of Semitic Languages at Johns Hopkins University in 1883. He is the author of "Akkadian and Sumerian Cuneiform Texts in British Museum"; "The Babylonian Nimrod Epic"; "The Cuneiform Account of the Deluge"; "The Akkadian Language"; etc.

Haupt, William Ayres ("William A. Mestayer"), an American actor and playwright; born in Philadelphia, June 8, 1846. He made his first appearance in 1862. He was a popular comedian, and has played with Edwin Forrest, Lester Wallack, and other well-known actors. During the Civil War he served in the engineering corps of the Army of the Potomac. Among the plays which he wrote or assisted in writing are: "The Tourist in a Pullman Car"; "We, Us & Co."; "Tobogganing"; "The Grab Bag"; "The Kitty." He died in New York, Nov. 21, 1896.

Hauptmann, Gerhart (houpt'män), a German dramatist and poet; born in Salzbrunn, Silesia, Nov. 15, 1862. He was a scholar of solid attainments at Jena and Berlin. His taste for practical sociology comes out strongly in his intense and powerful poems and dramas; he settled on a small Silesian farm solely to study peasant life. He traveled widely, visiting the United States in 1894. His first play, "Promethidenlos" (1885), was conventional; but under Ibsen's inspiration he soon broke away from the old lines, producing "Before Sunrise" and "A Family Catastrophe," tragedies presenting the genetic conditions of proletarianism. These and subsequent plays gave him world-wide repute. He later turned to comedy, but "The Weavers" and its successors represent his forte. "The Apostle" (1892) is an attempt at fiction.

Hauraki (hō-rä-'kē), a gulf and a gold bearing peninsula of New Zealand, opposite Auckland.

Hauran (hä-ran'), a large district in Syria, E. of the Sea of Galilee. The name is sometimes restricted to one fertile plain there.

Hauréau, Jean Barthélemy (ō-rā-ō'), a French historian; born in Paris in 1812. He held posts in the National Library and the National Printing Office. He wrote on Poland, Francis I., Charlemagne, St. Victor, etc., but is best known by his great "History of Scholastic Philosophy." He died in 1896.

Hausmannite, a tetragonal mineral, generally crystallizing in octahedrons. Hardness, 5 to 5.5; sp. gr., 4.7; luster, sub-metallic; color, brownish-black, streak chestnut-brown. Composition: Manganese, 72.1; oxygen, 27.9 = 100. Found in Thuringia, in the Harz, in Pennsylvania, etc.

Haussa, or **Houssa** (hö'sä), a people of the Sudan, who have been conquered by the Fulbé, and now constitute the larger part of the population in Sokoto, Adamawa, and Gando. Whether they are of pure Negro race, or an immigrant wave of ancient Hamitic stock, now indistinguishable from the Negroes, is not yet fully determined. Their language is allied in its grammatical forms with the Hamitic tongues to the E. and N., while its vocabulary resembles in many points that of the neighboring Negro tribes. At any rate the Haussa language is the common medium of communication in the commercial world of central Sudan. The Haussa themselves are keen traders, and also occupy themselves with agriculture and industrial pursuits (weaving, dyeing, tanning, etc., and the making of baskets, pottery, and iron implements). They have adopted Islam from their conquerors.

Haussmann, Georges Eugene (hōs-män'), a French official; born in Paris, March 27, 1809. Entering the public service under Louis Philippe, he distinguished

himself in various parts of France and under Napoleon III. rose to be prefect of the Seine (1853). Then it was that he began his task of improving the outward appearance of Paris by widening streets, laying out boulevards and parks, building sewers, barracks, bridges, and similar public works. He died in Paris, Jan. 11, 1891.

Haussonville, Gabriel Paul Othenin de Cléron, Comte d' (dōs'ôn-vēl), a French littérateur; born in Guscyet-Châtel, Seine-et-Marne, Sept. 21, 1843. He became a member of the French Academy, and one of the leading contributors to the "Review of the Two Worlds." His reputation rests on literary monographs among which are "Sainte-Beuve, His Life and Works" (1875); "George Sand"; "Prescott," etc. (1879–1888); and works like "Across the United States" (1883), notes and impressions; "Social Studies" (1886); "Madame de La Fayette" (1891); etc.

Haussonville, Joseph Othenin Bernard de Cléron, Comte d', a French historian, father of the preceding; born in Paris, May 27, 1809. He was once in the diplomatic service, but entered parliamentary life. His "History of the Reunion of Lorraine to France," and "History of the Foreign Policy of the French Government From 1830 to 1843," are valuable. He died May 28, 1884.

Haussonville, Louise d', a French novelist, wife of Joseph; born (Princess de Broglie) in 1818. "Robert Emmet" is her best novel. She wrote much about Byron. She died in 1882.

Hautboy (hō'boy), an oboe; a wooden musical instrument of two foot tone, played with a double reed. Also an organ stop, consisting of reed pipes slightly conical, and surmounted by a bell and cap of eight feet pitch. The tone is thin and soft. There is a variety of the stop known as the orchestral hautboy. In botany a kind of strawberry, *Fragaria elatior*. Probably only a variety of the wild strawberry, *F. vesca*. It is, however, much larger, with the leaflets often shortly stalked. The name is probably from the high woods of its native Bohemia.

Haute-Garonne. See GARONNE, HAUTE.

Haute-Ile (hōt'ēl), an island of British North America, in the Bay of Fundy, about 8 miles S. W. of Cape Chignecto.

Hautelisse Tapestry (ōt-lis'), a kind of tapestry wrought with a perpendicular warp, as distinguished from *Basselisse*.

Haute-Loire. See LOIRE, HAUTE.

Haute-Marne. See MARNE.

Hautes and Basses Alpes. See ALPES.

Haute-Saone. See SAÔNE, HAUTE.

Haute-Savoie. See SAVOIE.

Haute-Vienne. See VIENNE, HAUTE.

Haüy, René Just (ä-wē'), a French mineralogist; born in St. Just, department Oise, Feb. 28, 1743. He took priest's orders. His attention was first turned to botany, and it was not till middle life that he commenced the study of mineralogy. He is the discoverer of the geometrical law of crystallization, and he also considerably enriched our knowledge of pyro-electricity. He died July 3, 1822.

Haüy, Valentin, a French teacher of the blind, brother of the preceding; born in 1745. He wrote a noted "Essay on the Education of the Blind." He died in 1822.

Hauyne, a rock-forming mineral, having approximately the same composition as nosean. The two are probably only varieties of one and the same material. They are anhydrous silicates of alumina and soda, or alumina and lime, with sodium and calcium sulphate. They crystallize in isometric forms, and have a hardness = 5–5.5, and a sp. gr. = 2.2–2.5. Hauyne is usually bright blue to bluish-green while nosean is generally gray, but sometimes greenish or even dark brown. They are essentially of volcanic origin, occurring as constituents of many recent lavas.

Hauyne Basalt, a basalt, having as its chief constituents leucite, nepheline, hauyne, augite, and magnetite, with occasionally some olivine and apatite. It is called also hauynophyr.

Havana, a city and capital of the Republic of Cuba, on Havana Bay, on the N. coast. It is one of the most important commercial points in the Western hemisphere, and its harbor is one of the finest in the world, well sheltered, and entered through a deep and narrow channel, opening into a large basin, capable of sheltering 1,000 vessels. The harbor is provided with excellent covered wharves, and a dry dock. The city is divided into two sections, the older one of which has narrow, crooked streets, while the modern Havana has broad and beautiful avenues, with macadamized drives, lined with palm trees. The parks and promenades of Havana are among the most beautiful in the world; among them are the Plaza de Armas, in front of the governor's palace; the Alemeda de Paula, along the bay; and the Parque de Isabel. Among the notable buildings are the Opera House, the largest in the world; the Cathedral, built in 1724; the Government Buildings; and the celebrated fortresses, Morro Castle and Punta, at the mouth of the harbor; and La Cabana, a fortress S. E. of Morro, the largest and strongest in Havana. The city

has a university, botanical gardens, scientific, educational and benevolent societies, gas and electric lights, and an excellent water supply, from the Chorrera. From 1761 till after the American occupation yellow fever was epidemic every summer, often very severe, but improved sanitary conditions, due to the rigid rule of the American military authorities, have in a large measure overcome the disease, and in 1901 it was considered as wholly stamped out. The manufactures of the city include cigars and cigarettes, sugar, rum, molasses, honey, and preserved fruits. It has railroad communications with Cabanos, Matanzas, Santiago, and other cities, and steamship lines to the United States, France, Spain, and Great Britain. Havana was for years the seat of Spanish power in Cuba. The Cuban Evacuation Commission met under the provisions of the protocol of peace; the city was formally evacuated on Jan. 1, 1899, and after that Havana was the seat of the American military government till the evacuation in 1902. Pop. (1907) 302,526. For details of the blowing-up of the "Maine," of the events leading to the declaration of war against Spain by the United States, of the evacuation of the city by the American military authorities on the establishment of the republic of Cuba in 1902, etc., see CUBA.

In the brief period of American occupation Havana was transformed from one of the most disease-stricken ports in the world into a charming tropical city—a result due entirely to American enterprise. Shanties and sheds that had been for decades breeding places for cholera germs were ruthlessly swept away; streets never repaired in the memory of living man were cleaned or repaved; sewers were rebuilt and houses were unceremoniously entered and disinfected. All this work was done, not spasmodically, but systematically. Cleaning squads were sent from house to house; apartments were cleaned regardless of the protests of their inmates. The accumulations of years from cellars were thrown out. Such an arbitrary procedure would, no doubt, raise a storm of indignant protest from the people of North America. But the health and safety of Havana demanded it.

The most admirable work of all was the cleaning of the sewers. Not since the day when they were first built had they been looked after. Many of them were choked by the refuse of decades. The American authorities not only managed to repair the sewer system and render it in every way serviceable, but did so without injuring the life of a single laborer. The streets of the city were thoroughly cleaned, and in many cases transformed. Narrow thoroughfares were widened. A magnificent sea wall and a promenade were built; parks were cleared and converted from haunts for thieves into pleasure grounds for the people.

The worst pest hole in Havana was the Hospital Militar. To be carried to that place was like being carried to one's grave. Not more than 30 per cent of the patients who entered its walls ever came out alive. American surgeons avoided it; soldiers held their breath when they passed it. The sanitary squad of the engineer corps took possession of the building, cleaned it from attic to cellar, coated its walls again and again with whitewash and finally left the building clean and wholesome. It is now used for a schoolhouse.

Naturally the Cubans disliked the fumigation and disinfection process to which they were subjected. What was good enough for their grandfathers was good enough for them, they thought. Probably most of the Cubans, if the matter of cleaning the city had been put to popular vote, would have decided against the transformation. Now that the streets are cleaned, the parks trimmed and lighted and the sea promenades enjoyable, they have revised their opinions of American extravagance and have even begun to take a certain pride in the new capital. What the effect of the sanitary improvement of the city has been is easily proven by a comparison of the vital statistics in past years. In 1896 no less than 1,262 deaths from yellow fever alone were reported to the city government. The average for the 11 years preceding American occupation was 440 fatal cases. In 1901, for the first time in the history of the city, the yellow fever season passed without five fatal cases of the disease. October, November and December, the three months in the year during which the fever was the worst under Spanish rule, passed without the occurrence of a single case.

Havelock, Sir Henry, an English general; born in 1795. In 1856 he commanded a division of the army which invaded Persia. In 1857, upon the breaking out of the Sepoy mutiny, he made a forced march from Allahabad to Cawnpur, but reached the latter city too late to prevent the massacre which occurred there. After defeating the rebels in three different engagements, he continued his march toward Lucknow, then beleaguered by a formidable force of mutineers. After victoriously fighting eight more battles with the enemy, he fought his way through the besieging army around Lucknow, and accomplished the relief of its exhausted garrison. For this service he received general rank, was created a baronet, and decorated with the cross of the Bath. He died in 1869.

Haverford College, an educational institution in Haverford, Pa.; founded in 1833, by the Society of Friends, under the name of Haverford School, and was made a college in 1856. It possesses a well-se-

lected library, a chemical laboratory, philosophical apparatus, mineralogical and geological cabinets, an astronomical observatory, and a gymnasium. It was the first collegiate institution founded and conducted entirely within the Society of Friends, and since 1849 others besides the sons of Friends have been admitted. The college has an endowment of about $1,400,000; grounds and buildings valued at over $1,650,000; scientific apparatus, etc., $20,000; volumes in the library, about 53,000; fellowships, 3; scholarships, 66; ordinary income, $110,000; average faculty, 20; average students, 160.

Havergal, Frances Ridley, an English author; born in Astley, Worcestershire, Dec. 14, 1836. She began to write hymns and letters in verse at the age of 7, but did not publish anything till 1860. She was a frequent contributor to "Good Words." Among over 30 publications, which once enjoyed considerable popularity, may be noticed: "The Four Happy Days" (1873); "Under the Surface" (1874), poems; "Royal Graces and Loyal Gifts" (6 vols. 1879); "Under His Shadow" (1879); and a number of posthumous works by various editors. She died in Swansea, Wales, June 3, 1879.

Haverhill, a city in Essex co., Mass.; on the Merrimac river, and on the Boston and Maine railroad; 33 miles N. of Boston. It is connected by bridges with the towns of Groveland and Bradford on the opposite side of the Merrimac, and has extensive manufactures of boots and shoes, hats, cotton and woolen goods, leather, lumber, and brick. It is the trade center of a large farming district, and has gas and electric lights, electric street railways, waterworks, public high school, public library, daily and weekly newspapers, 6 National banks, and an assessed property valuation of over $26,000,000. The city, originally the Indian village of Pentucket, was settled in 1640, incorporated as a town in 1645, was the birthplace of John Greenleaf Whittier, and was chartered as a city in 1869. Pop. (1900) 37,175; (1910) 44,115.

Haver=Schmidt, François (häv'er-shmit) ("Piet Paaltjens"), a Dutch prose and verse writer; born in Leeuwarden, Feb. 14, 1835. He studied theology at Leyden, and was pastor of "Reformed" churches in various parts of the Netherlands for some years. While still a student he produced a series of parodies, love songs, and sketches (called in collected form "Skits and Jests"), which are now known almost by heart to the whole Dutch collegiate world. Later he wrote realistic novels and tales of a somewhat serious tendency. Among them are "My Brother's House"; "The Pastorate of My Grandfather"; and various others. His pictures of Dutch life are vivid and well drawn. He died in Schiedam, Jan. 19, 1894.

Haversian Canals, or **Haversian Tubes,** in anatomy, certain canals in bone, to which attention was first called by Havers. The haversian canals are the protectors of the blood vessels constituting the nutritive system of the bones. In the spaces between the haversian canals are the lacunæ and their canaliculi. Every haversian canal has a number of lacunæ around it, connected to it, and also to each other, either directly or indirectly by the canaliculi projecting from them. The haversian canals, as a general rule, lie almost parallel to the compact tissue; they are smallest near the surface of a bone, and largest near its center. The haversian system forms a network in all bones, long, short, flat, etc. There is not a pore to be seen in the articular facets of the femur or other bone covered by cartilage, not even canaliculi or haversian canals penetrate, but all other parts of the bone are porous. The cancelli are formed by the absorption of the walls of the haversian canals.

Haverstraw, formerly Warren, a city in Rockland co., N. Y.; on the Hudson river, and on the West Shore, the New Jersey and New York, and the New York, Ontario and Western railroads; 35 miles N. of New York city. It is the largest brick manufacturing city in the world, producing nearly 900,000,000 common brick per year. Other manufactures are brick making machinery, dynamite, and baskets. The city has several parks, and points of interest, electric lights and street railways, daily and weekly newspapers, a National bank, and an assessed property valuation of $2,000,000. Pop. (1890) 9,079; (1900) 9,874; (1910) 5,669.

Havre, or **La Havre** (ävr), formerly Havre de Grace, a fortified town, and the principal seaport on the W. coast of France. It is built on a low alluvial tract of land recovered from the sea, and is divided into unequal parts by its outward port and basins. The town has wide thoroughfares, and is clean and well-built, but presents few architectural features of interest. The port, which is the best and most accessible on the coast, consist of three basins separated from each other, and from the outer port, by locks, and is capable of accommodating about 450 ships. There are two roadsteads; the great, or outer, is about a league from the port, and the little, or inner roadstead, about half a league. Havre, being the seaport of Paris, most of the colonial and other products destined for its consumption are imported thither. The manufactures are chemicals, furniture,

earthenware, oil, tobacco, rope, etc. Shipbuilding is also extensively engaged in. Lines of steamers connect Havre with the principal English ports, and establish a mail service between France and the United States. Pop. (1906) 132,430.

Hawaii, a territory of the United States of America, consisting of a group of islands in the middle of the Pacific Ocean; 2,000 miles from San Francisco; area, 6,449 square miles; capital Honolulu; pop. (1900) 154,001; (1910) 191,909.

Topography.— The surface of the islands is exceedingly mountainous and of volcanic origin, with numerous active and quiescent volcanoes. The most prominent physical features of the group are the mountain peaks of Mauna Kea, and Mauna Loa, both 14,000 feet in height. Kilauea, on the Mauna Loa mountain in Hawaii, is the largest active volcano in the world, and has an oval-shaped crater, 9 miles in circumference, and 6,000 feet above sea level. On the island of Mani is the dormant crater of Mount Haleakala, from 25 to 30 miles in circumference, and 3,000 feet deep, standing 10,000 feet above sea level. On account of its insular formation the coast line is extensive, but there are few good harbors, Pearl harbor at Honolulu being the only important one. The rivers are few and unimportant, being mere mountain streams.

Climate, Soil and Productions.— Though the islands are entirely within the tropics the climate is mild, tempered by the N. E. trade winds, blowing nine months of the year. The rainfall in the mountain region is quite abundant, but on the coast slopes rain seldom falls. The soil is very fertile, being formed by the disintegration of the volcanic rocks and decay of vegetable matter. There is abundance of good pasturage, and cattle and sheep raising are important industries. The N. E. mountain slopes are covered with dense forests, and sugar cane, Indian corn, coffee, and wheat are cultivated on the plains. Tropical and semi-tropical fruits are grown to a small extent, and though the natural water supply is quite small, the ground, under artificial irrigation, may be made extremely productive. Sugar is the staple industry and is largely cultivated throughout the islands. It was cultivated in very small quantities before 1876, when a treaty of commercial reciprocity with the United States came into effect. Under the provisions of this treaty an era of unexpected prosperity set in, and the production of sugar, as well as rice, increased more than was ever anticipated. Large barren tracts of land were brought into cultivation by extensive irrigation, some of the ditches being 40 miles in length, carried through dense woods, tunneled through rock, and spanning wide cañons. About 90,000 acres are taken up with the various plantations, with a yearly yield of about 225,000 tons of sugar. It requires an average of 18 months for a crop to mature, the ordinary yield being 3½ tons to the acre; yet on specially rich alluvial soil it is sometimes as great as 9 tons to the acre.

Next in importance comes rice. Its culture is principally carried on by Chinese, and in the San Francisco market it grades with the best coming from China. The ground is plowed and well harrowed, the field is then submerged, the water being allowed to stand till the crop ripens, when it is drawn off. The method of cultivating is crude and primitive. The Chinaman sows the seed thickly in a small field: when the plants are about six inches high they are pulled up and taken to the field for planting, where they are set out in the mud by hand in rows about eight inches apart. When matured the water is drawn off to allow the straw to ripen. The crop is then cut with the sickle. No threshing machines are used by the Chinese rice grower but the grain is separated from the chaff by being beaten out with the hoofs of horses or Chinese cattle, as in ancient times.

Coffee is cultivated, but not to a large extent, although Hawaiian, or Kora, coffee takes a high place among the best coffees of the world; the trees are grown anywhere from the sea-level up to 3,800 feet above the sea. One of the greatest difficulties to contend with is insect blight, which is greatly kept in check by peculiar parasites and ladybirds that have been introduced for each kind of insect. The cultivation of tea is carried on with good results, the best quality of leaf being obtained on the higher elevations. The high price of labor prevents its more extensive cultivation.

Hemp has been experimented with, and pronounced by experts to be of a good strong description. The expense of cultivation is trifling and the yield per acre is about 13½ tons. Ramie or vegetable silk, grows luxuriantly, but the industry is not developed owing to the want of suitable machinery.

The soil and climate of Hawaii cannot be excelled for the production of tropical and sub-tropical fruits, and their introduction has added largely to the prosperity of the islands, especially so in the case of semi-tropical fruits, such as the alligator pear, banana, lime (*Citrus limetta*), orange, and lemon. The alligator pear grows to a large size, and the fruit is of a superior quality. The flesh is of buttery consistency, with a nutty flavor and it makes a delicious dressing for salads; the largest of these heads is about six inches long and weighs upward of three pounds. The mango grows in great profusion, and several varieties are used for making chutney, the best varieties having been imported from India and Jamaica. It is an evergreen with small, glossy leaves;

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and a gum which exudes from the trunk of the tree is used in medicine. It bears fruit several months of the year, and it is not unusual to find trees with fruit on one side and blossoms on the other.

Cocoanuts grow all along the seashore or any spot where nothing else will grow; but they are now very little cultivated. The sapodilla, soursop pommelo, cherimoya, custard apple, papaw, citron, watermelon, granadilla, pomegranate, and tamarind are some of the desirable exotic fruits that do well in the islands. Vegetables of all descriptions are raised throughout the year, and water and cantaloupe melons are superior to those grown in most countries. Pineapples grow wild on all the islands; there are some 25 varieties taking their names from the localities whence they are obtained. Near Pearl City, some 8 miles from Honolulu, a plantation of an excellent variety exists. The average weight of the fruit is 8 pounds, though the fruits of some varieties have been known to reach a weight of 17 pounds. The pineapple season is from the middle of the month of May to the middle of August.

Bananas are raised in great quantities and shipped to the United States, the cost of cultivation being very small. Along the mountain ranges are trees and vines in luxuriant growth, forests of a magnificent species of tree, whose wood has beautiful markings, and capable of taking a high polish, equaling the finest walnut and mahogany; this is the koa tree. The islands at one time were very rich in sandalwood, but when the natives found it would be a great source of income to them, they cut down the old trees in a very short space of time and sold them to dealers in the United States, and neglected to plant young trees for a future supply.

Not the least important vegetable product is taro. It consists of two kinds — the upland, which grows on the hillsides in dry ground, and the lowland, or more important staple, which is propagated like rice, under water. Long irrigating ditches are required in preparing the bed. The ground is leveled off and inclosed by a wall impervious to water. The floor of the patch is made as rich as possible and the top is cut from the ripe roots and set out in hillocks placed several feet apart. The water is let in and allowed to remain until the crop is mature, *i. e.,* in about 12 months, the only labor required being to keep the soil clear of weeds and provide a depth of about 6 inches of running water. Taro can be planted at any season and a ripe crop obtained. The root is oblong, the largest being about one foot in length and from three to four inches in diameter. The root is baked by the natives, who make from it what they call *poi,* the baked root being pounded till it forms a paste which is thinned by adding water, and afterward allowed to ferment. As a food it is most nutritious.

Another important plant much used by the natives is the ti; it has also a large, oblong root, and the leaves are of a shining green tint. The ti leaves were at one time woven together, and formed a short cloak, which the natives sometimes wore. The root, after baking, is sweet and pleasant to the taste. It is also used to make an intoxicating drink, by bruising the roots with a stone and steeping in water until it ferments. Besides the plants mentioned, there are many beautiful flowering and foliage plants, among which codiæums (crotons) are worthy of special mention. All the varieties grow in great luxuriance and show exceedingly rich leaf coloring. Round the college grounds in the suburbs of Honolulu, is a hedge of a night-blooming cereus (*Cereus nycticalus*), which is a magnificent sight when in flower, the blossoms ranging from two to three feet in circumference.

Irrigation.— On the Oahu plantation near Honolulu there are 36 artesian wells, 12 inches in diameter, varying in daily capacity from 1,000,000 to 2,000,000 gallons, all required to supply the plantation of 10,000 acres. Every day 10,000,000 gallons are necessary for each 1,000 acres. Twelve vertical inches of water each month have to be pumped on these thirsty fields, which have to be flooded every 10 days. The present yield of this plantation yearly is 18,000 tons, which ultimately will be increased to 40,000 tons.

Though the annual rainfall of the island of Oahu is 70 inches, dependence is placed on the wells alone. The soil of all the islands has a foundation of porous, volcanic rock, over which has been deposited seven or eight feet of loam, the product of ages of decaying vegetation. It is consequently easily drained and quickly absorbs the heaviest rainfall. A few hundred feet below the surface are inexhaustible supplies of water, and at no time have the wells failed to pour forth their wonted streams or to become reduced in their normal level. Even when the surface rainfall has been less, the wells have never yet been affected in the least.

Taking three of the best-known plantations of the island of Oahu, aggregating 50,000 acres, the total number of pumping plants are 24; wells, 108; and the daily amount of water required, 196,000,000 gallons, pumped to a height of 550 feet in some instances, and from that down to levels as low as 60 feet. In the island of Oahu there are altogether 209 artesian wells, supplying yearly 44,000,000,000 gallons, and scientific calculations prove that, deducting the natural loss from surface drainage and evaporation from the 600 square miles of the island, at least four-fifths of the yearly surface rainfall passes away without rendering any service to agriculture whatever.

The opening up of the new Olaa plantation, on the island of Hawaii, has demonstrated the existence of huge reservoirs on the slopes of the volcanoes of Mauna Loa and Mauna Kea, from which an immense and inexhaustible flow of water is to be obtained. The plantation embraces 19,500 acres, located on the E. side of the island, and encloses a strip 4 × 15 miles in dimensions, at an altitude ranging from sea-level to a height of 2,000 feet. The average annual rainfall varies from 160 to 200 inches. Along the slopes are found swampy places, where the interior waters have appeared above the surface, and occasionally flowing springs, suggesting hidden sources of water supplies. Exploration revealed a promising site for tunneling into the side of the mountain, and soon a great increase in the flow was encountered.

The use of dynamite demolished the walls of the reservoirs, and great floods of water resulted. No. 1 has regularly supplied 5,750,000 gallons daily, and No. 2, 4,250,000 gallons. United, these streams will be conducted to the mill of the plantation by a flume and used in transporting cane from the highest portions of the plantation to the site where it is manipulated, a distance of 15 miles.

The enormous rainfall of the island of Hawaii, compared with others of the group, is easily explained. The evaporation is great, and the humid air, driven by the prevailing N. E. trade winds against the lofty range of mountains, of which Mauna Loa, 13,675 feet, is the dominating summit, is condensed by the extreme cold of these high altitudes and falls to the ground. The reservoirs are great bubbles in the earth formed during volcanic eruptions. The discovery of these water reservoirs has greatly stimulated sugar planting in Hawaii.

Commerce.— The following summary shows the condition of commerce in the Hawaiian islands for the year 1898: Imports, $11,650,000; native exports, $17,346,000; customs receipts, $897,000; ships entered, 481; with a total tonnage of 569,632. The chief exports were sugar, $16,614,622; rice, $149,278; coffee, $115,944; and bananas, $66,580. The imports were mainly groceries and provisions, clothing, grain, lumber, hardware, machinery, and cotton goods. The commerce is carried on principally with the United States and Great Britain, the United States receiving over 99 per cent. of the Hawaiian exports. In 1898–1899 the United States received imports to the value of $17,831,463; and shipped exports to the value of $9,305,470.

Communications.— There were in 1900 three steamship lines plying between the United States and Hawaii, and one line from Canada, besides a number of sailing vessels between San Francisco and Honolulu. There were three railroads on the islands; the Kahului railroad, on the island of Maui is 13 miles long; the Hawaiian railroad on the Island of Hawaii 20 miles long, and the Oahu Railway and Land Company line, running from Honolulu to Waianae, with a length of 39 miles. In 1899 this latter road carried 85,596 passengers, and 66,430 tons of freight. There are telegraph systems in the islands of Maui, Hawaii, between Hawaii and Oahu and round the latter, with a total length of 250 miles.

Religion and Education.— There is no authorized religion. Nearly all the natives are Christians. There is a Church of England bishop and a Roman Catholic bishop at Honolulu, and ministers of various denominations. In 1896 there were 23,773 Protestants, 26,363 Roman Catholics, 4,886 Mormons, and 44,306 Buddhists, etc. Public schools are established all over the islands, and in 1897 there were 192 schools, with 507 teachers, 14,522 pupils, and a government appropriation of $144,389. Of the pupils 5,330 were Hawaiians, 2,479 half-castes, 3,815 Portuguese, and 1,638 Asiatics. Of the teachers 253 were American, 119 Hawaiian, and 69 British.

Banking.— On Oct. 31, 1901, there were reported 2 National banks in operation, having $512,500 in capital; $48,300 in outstanding circulation; and $50,000 in United States bonds. There were also 3 State banks, with $850,000 capital, $50,000 surplus, and $2,946,078 in resources, and 1 private bank, with $500,000 capital, $20,000 surplus, and $1,435,225 in resources.

Finance.—The revenue in 1898 was as follows: From customs $896,975; taxes, $811,818; internal revenue, $1,585,057; total, $2,568,489. The expenditures amounted to $2,186,278; the chief branches of expenditure being: public debt, $102,659; instruction, $229,115; army, $54,534; public works, $239,157; sanitary works, $194,966; and attorney-general, $241,031. The public debt in 1899 amounted to $4,457,605, with interest varying from 5 to 12 per cent.

History.— The Hawaiian Islands were discovered by the Spaniards under Gaetano in 1549, and examined by Captain Cook in 1778, and during the greater part of the 19th century formed an independent kingdom, recognized as such by the United States, Great Britain, France, and other governments. In 1893 the reigning queen, Liliuokalani, was deposed and a provisional government formed. This provisional government resolved itself into a Republic in 1894, with two Houses and a President. Several attempts were made toward the annexation of Hawaii to the United States, and on July 7, 1898, the Congress of the United States passed a resolution to that effect. On Aug. 12, 1898, Hawaii was for-

mally annexed to the United States. The islands, now known as the territory of Hawaii, are governed by a governor appointed by the President, and for military purposes are attached to the Military Department of California. All whites, natives of Hawaii, and persons of African descent who were citizens of Hawaii before the annexation, are citizens of the United States. The president of the provisional and republic governments and also the first governor after annexation was SANFORD B. DOLE (*q. v.*).

Hawarden (här'den), a small market-town of Flintshire, North Wales. There are some manufactures of tiles, pottery, etc. Lady Hamilton passed her girlhood here. Hawarden Castle, Gladstone's home, dates from 1752.

Haweis, Hugh Reginald (hois), an English clergyman and author; born in Egham, Surrey, April 3, 1839. He was a Cambridge graduate. His terse and vigorous language and a rare capacity for exposition have given his score of books a wide circulation; among them may be mentioned: "Music and Morals" (1871; 13th ed. 1885), in which he expounds the emotional theory of music; "Thoughts for the Times" (1872); "Shakespeare and the Stage"; "Unsectarian Family Prayers" (1874); "Pet, or Pastimes and Penalties" (1874); "American Humorists" (1883); "Life of Queen Victoria" (1887); "The Broad Church"; "Old Violins" (1898); etc. He died Jan. 29, 1901.

Hawes, Joel, an American Congregational clergyman; born in Massachusetts in 1789. He was settled at Hartford, Conn., 1818–1867. He wrote: "Religion of the East"; "Looking Glass for Ladies"; "Washington and Jay"; "Tribute to the Pilgrims"; etc. He died in 1867.

Hawfinch (*Coccothraustes vulgaris*), a bird of the grosbeak genus and the finch family. It is considerably larger than the chaffinch; the adult male has the crown and back chestnut-brown, the neck and breast pale brown, the neck crossed at the back by a broad band of ash color, wings partly black, greater wing-coverts grayish-white, lesser wing-coverts black or blackish-brown. The hawfinch is a very shy bird, perching on the topmost branches of trees, or on open boughs where it can command a good lookout, and avoiding man unless subdued by the effects of hunger or cold. It is gregarious. It feeds on the fruit of the hornbeam, plum, pine, cherry, laurel, holly, hawthorn, etc. It is not uncommon in some parts of England, but is rare in Scotland. It is widely distributed over Europe and the temperate parts of Asia, and is said to be found in Egypt.

Hawk, the name of the several species of the genera *Accipiter* and *Astur*. The sparrow hawk is *Accipiter nisus*, the goshawk, *Astur palumbarius*. *Nauclerus furcatus* is sometimes called the swallow-tailed hawk; it is, however, a kite. Also the name of the sub-family *Accipitrinæ*, called more fully sparrow hawks. The bill is short, suddenly curved from the base, with

AFRICAN HAWK.

a large festoon in the upper mandible. The wings are short, the quills internally emarginate at their base. The tail is rounded. The male is often much smaller than the female. The anterior claws are very unequal. Hawks are generally distributed over the globe. They usually fly low when in pursuit of their prey, which consists of small birds and mammals. They build in trees, laying from three to five spotted eggs.

Hawkbit, a genus of plants of weedy aspect belonging to the natural order *Compositæ*, closely related to and formerly united with dandelion, from which it has been separated on account of the feathery pappus. The name is due to the deep tooth-like lacerations of the leaves. Several species are natives of Great Britain, and these, along with a few others comprised in the genus, are widely distributed in Europe and Russian Asia.

Hawke's Bay, a provincial district of New Zealand, on the E. coast, between Auckland and Wellington. The bay known as Hawke's Bay was first entered by Captain Cook in 1769, and was so named after

Sir Edward Hawke, then First Lord of the Admiralty. It is almost all suitable for farming, and the forests are of enormous extent. Napier is the port and chief city.

Hawkesbury, a river of New South Wales, Australia, rises in the Cullarin Range, and enters the Pacific at Broken Bay. It has a total length of 330 miles. The Hawkesbury is crossed by a steel girder bridge (1886–1889) on the railway between Sydney and Newcastle. It carries a double line of rails, and is one of the largest structures of its kind in the world, having seven spans of from 410 to 416 feet, and a total length between abutments of 2,900 feet.

Hawkesworth, John, an English miscellaneous writer; born in London, probably in 1715. In 1744 he succeeded Dr. Johnson on the "Gentleman's Magazine"; and in 1752 he started, with Johnson and others, a successful periodical called "The Adventurer." He was chosen by Captain Cook to prepare the account of his first voyage, which formed vols. ii and iii. of Hawkesworth's "Voyages" (3 vols. 1773). He died Nov. 17, 1773.

Hawkeye State, a designation of Iowa —so named in memory of a famous Indian warrior.

Hawkins, Anthony Hope, an English novelist; writing under the name "Anthony Hope"; born in London, Feb. 9, 1863. He was admitted to the bar in 1887. Among his best-known works are: "A Man of Mark" (1890); "Father Stafford"; "The Prisoner of Zenda"; "The Indiscretion of the Duchess"; "Phroso"; "Heart of the Princess Osra"; "Rupert of Hentzau"; "The King's Mirror"; etc.

Hawkins, Frederick, an English journalist and author; born in 1849. He assisted in establishing the "Theater," and was dramatic critic of the "Times" for a short period. His works are: "Life of Edmund Kean" (1869); "Annals of the French Stage, From Its Origin to the Death of Racine" (1884); and a continuation of it to the Revolutionary period inclusive under the title of "The French Stage in the Eighteenth Century" (1882).

Hawkins, Hamilton Smith, an American military officer; born in South Carolina in 1834. He entered the army as 2nd lieutenant in 1861. He was brevetted captain for gallant services at Gettysburg and was made captain in the 6th infantry in 1863. He was brevetted major for services in October, 1865. In 1897 he was colonel of the 20th infantry, commanding Fort Leavenworth, Kansas. When war was declared against Spain (1898) he was within a few months of the retiring age, but went to the front as a Brigadier-General of volunteers. He led the desperate and now historic charge at San Juan, Cuba, July 2, 1898, and was made Major-General of volunteers, July 8, 1898, going on the retired list the following October.

Hawkins, Sir John, an English writer on music; born in London, March 30, 1719. He collected a most valuable musical library, and after 16 years of laborious research produced in 1776 his "General History of the Science and Practice of Music," in 5 vols. quarto — a work of admittedly great and accurate scholarship. He died May 21, 1789. His son, JOHN SIDNEY, published a history of Gothic architecture; his daughter, LÆTITIA, her own "Memoirs," with many anecdotes of Dr. Johnson.

Hawk Moth, a family of lepidopterous insects, forming along with the clear winged moths and the burnets and foresters

HAWK MOTH.

the tribe *Sphinges*. They have stout bodies, large heads with prominent eyes, and stout short antennæ. The wings are long, narrow, more or less pointed, and have always a retinaculum. They are insects generally of rapid flight, and fly about in the twilight; some species also during the day. Their caterpillars are sixteen-legged, flat, smooth, often green, with transverse stripes on the sides and nearly always a horn on the back of the second last segment. They change to pupæ either on the surface of the ground or in a cell underground which they form for the purpose. Some of the South American species resemble humming-birds so closely that they cannot on the wing be distinguished from them, the natives there and even educated whites firmly believing that the one is transmutable into the other. One of the most remarkable hawk moths is the Death's-head (*Acherontia atropos*). It sometimes measures nearly 6 inches across the wings;

the fore wings are brown, the hind wings pale brown with black bands; and on the back of the thorax is a pattern in gray and black having a certain resemblance to a skull. The privet hawk moth, the type of the family, measures about 4 inches across the fore wings, which are of a pale brown color, with darker markings; the hind wings are pale pink crossed by three black bands. Its green caterpillar, with white and lilac streaks on the sides and a black horn on the back, feeds on privet and lilac, and the position it assumes when resting suggested that of the mythological Sphinx to the old naturalists, who applied this name to the insect.

Hawk Owl, a name for the Great Snowy Owl or Harfang, *Surnia nyctea.* In the plural the word is applied to the genus *Surnia.* The size is large, the head and ears small, the facial disk imperfect, the wings long, the tail considerably lengthened, cuneated or graduated, the flight diurnal.

Hawks, Francis Lister, an American clergyman; born in Newbern, N. C., June 10, 1798; practised law for a time with success, but in 1827 was ordained to the Episcopal ministry. He was Professor of Divinity at Washington (now Trinity) College, Hartford, in 1830–1831, and after ward rector of churches in New York, New Orleans, and Baltimore. He published "Contributions to the Ecclesiastical History of the United States"; "Commentary on the Constitution and Canons" (1841), and, with Bishop Perry, "Documentary History of the Protestant Episcopal Church." He edited Alexander Hamilton's state papers (1842), Commodore Perry's "Expedition to Japan" (1852–1854), and Appleton's "Cyclopædia of Biography" (1856). He died in New York, Sept. 26, 1866.

Hawksbeard, a genus of annual and biennial plants belonging to the natural order *Compositæ,* so closely related to hawkweed that some of the species are referred to the one genus or the other according to the peculiar views of individual botanists. The species are widely distributed through Europe and Asia. Doubtful medicinal properties have been ascribed to several species, and *C. lacera,* a native of the Apennines, is said to be poisonous.

Hawksbee, or **Hauksbee, Francis,** an English natural philosopher; born in the 17th century. He is well known as the improver of the earlier air-pumps of Boyle, Papin, and Hooke, and as the first who used glass in the electrical machine. He died about 1730.

Hawksbill, in zoölogy, a name for *Chelone imbricata,* a species of turtle which has the shell imbricated and elliptically keeled, the carapace spotted and rayed; in the young, the ends of the carapace obliquely truncated. The flesh is not good for eating; the eggs are good. The horny epidermis plates of the carapace furnishes the tortoise-shell of commerce. The animal inhabits the Indian Ocean, the Pacific, and the warmer parts of the Atlantic.

Hawkweed, a genus of plants of the natural order *Compositæ,* sub-order *Cichoraceæ.* The species are perennial herbs of no popular interest with the exception of the orange hawkweed (*H. aurantiacum*), a native of the S. of Europe, which on account of its handsome orange flowers is frequently cultivated in gardens. The popular name is founded on an ancient belief that birds of prey used the juice of the species to strengthen their vision. The English name Hawkweed, the German Habichts-kraut, and the French Épervière all testify to this curious belief having been formerly universally entertained.

Hawkwood, Sir John, in Italian, L'Acuto or L'Aguto, an English captain who won renown in Italy in the wars of the 14th century. He distinguished himself at the battles of Crécy and Poitiers. After peace was signed at Bretigny (1360) he gathered a band of mercenary soldiers and led them to Italy, where he at first took service with Pisa against Florence. Then, after fighting in most of the petty Italian wars of the period, notably for the Visconti and for Pope Gregory XI., he agreed to fight the battles of Florence in return for an annual pension. He died in 1394.

Hawthorn, in botany, *Cratægus oxyacantha,* one of the *Rosaceæ,* a small, round-leaved and much-branched spinescent tree, from 10 to 20 feet high, with deeply pinnatifid leaves and many flowered corymbose cymes of white, fragrant flowers, with pinkish-brown anthers. It is found in woods, in many hedge-rows, in gardens, etc. The fruit is called haw. *Rhus oxyacantha,* the Indian hawthorn, is the genus *Rhaphiolepis,* the native hawthorn of New Zealand, *Discaria toumatou.*

Hawthorne, Julian, an American novelist and journalist, son of Nathaniel; born in Boston, June 22, 1846. On leaving Harvard University he studied civil engineering in Dresden, but took to authorship. His success was not rapid, but popular favor has been accorded to the novels "Idolatry," "Fortune's Fool," "Sinfire," "Beatrix Randolph," "Archibald Malmaison," "A Fool of Nature" and "Garth." As a journalist he has traveled widely in prosecution of his work.

Hawthorne, Nathaniel, an American novelist; born in Salem, Mass., July 4, 1804. He was graduated at Bowdoin in

1825. For a number of years after this he led a retired and studious life in Salem, writing tales, many of which he burned, while others appeared in newspapers and magazines. In 1832 he published anonymously a romance, "Fanshawe," and in 1837 his "Twice-told Tales," a collection of stories which he had contributed to various American periodicals. In 1839 he received an appointment in the Boston custom house, but lost it in 1841 on a change of government. On quitting this appointment he joined the Brook Farm Association which was founded upon principles similar to those inculcated by Fourier, but in less than a year the establishment broke down. In 1843 he married and settled in the charming village of Concord, occupying the old parsonage in which Emerson had previously lived, and hence the title of his next work, "Mosses from an Old Manse" (1846). In 1846 he was appointed surveyor of the port of Salem, and held this post three years. In 1850 was published "The Scarlet Letter," a romance of early New England life, which was received with the warmest admiration both in America and Europe; and this was followed in 1851 by the no less popular "House of Seven Gables." "The Blithedale Romance" came out in 1852. In 1853 he was appointed American consul at Liverpool by his college friend, Franklin Pierce, then President of the United States. This office he held till 1857, when he went to travel on the Continent. Other works of his are the romance of "Transformation" (1860), by many critics considered the best of his works, "Our Old Home" (sketches of England and the English), and "The Snow Image." His writings display poetic feeling and great descriptive power, a deep knowledge of the human heart, a pensive melancholy combined with a delicate humor, and a style singularly chaste, elegant, and flowing. He died in Plymouth, N. H., May 18, 1864.

Haxo's System, a fortification method introduced by François Nicolas Bénoit Haxo, a French military engineer, employed by Napoleon to fortify Peschiera, Mantua, etc., and who conducted the siege of Antwerp in 1832. His casemated batteries have earthen parapets along their front, and their arches are well covered with earth. They are open to the terreplein in the rear, and there are apertures in front of the guns, opening into embrasures formed in an extension of the parapet at these points, beyond its ordinary retired position. Being open to the rear the circulation of air prevents any inconvenience from smoke. Batteries of the kind are to be found in many of our new works.

Hay, the stems and leaves of grasses and other plants cut for fodder, dried in the sun, and stored usually in stacks. The time most suitable for mowing grass intended for hay is that in which the saccharine matter is most abundant in the plants, viz., when the grass is in full flower. For the operation of mowing, dry weather, and, if possible, that in which sunshine prevails, is chosen. The making of the grass into hay generally takes three or four days to get it ready for stacking. This period is principally occupied in alternately shaking out the grass and gathering it up into small heaps, previous to stacking. Care must be taken to avoid haymaking either under a scorching sun or during the prevalence of rain, and the heaps should never be opened in the morning till the disappearance of the dew. In stacking the great object is to preserve the freshness of the herbage, and to induce a slight degree of fermentation. If the weather has been wet a few layers of straw may be inserted at intervals. Salting is also recommended. On large farms the work is performed by a haymaking machine in conjunction with other agricultural implements.

The total hay crop in the United States in 1903 was 61,305,940 tons, valued at $556.376,880. The greatest hay producing States were New York, Iowa, Missouri, Illinois, Pennsylvania, and Ohio.

Hay, Adelbert Stone, an American consul, son of John Hay; born in Cleveland, O., in 1876; was educated at Yale College; private secretary to his father in London, England, in 1898; United States consul to Pretoria, South Africa, 1899–1900, where he proved very efficient and won the esteem of both Boers and British; and appointed assistant secretary to President McKinley. He fell while asleep from a hotel window in New Haven, Conn., and was instantly killed, June 23, 1901.

JOHN HAY.

Hay, John, an American statesman and writer, born in Salem, Ind., Oct. 8, 1838. He was graduated from Brown University, and settled in Illinois as a lawyer, but went to Washington in 1861 as one of Lincoln's private secretaries, acting also as his aide-de-camp. He served under Generals Hunter and Gillmore with the rank of major and assistant adjutant-general. He

was subsequently in the United States diplomatic service, stationed at Paris, Vienna, and Madrid. In 1897 he was made ambassador to England, and in 1898, Secretary of State. His literary reputation rests upon "Pike County Ballads," the best known of which are perhaps "Little Breeches" and "Jim Bludso"; "Castilian Days," a volume of travel; and "Life of Abraham Lincoln" (with J. G. Nicolay). He died at Lake Sunapee, N.H., July 1, 1905.

Hay, Sir John Charles Dalrymple, an English admiral; born Feb. 11, 1821. He was actively engaged in Borneo (1845–1846), in operations against the Chinese pirates (1849), and in the Crimean War (1854–1856), retiring with the rank of rear-admiral in 1870. He was several times a member of Parliament in the Conservative interest. His works include: "The Reward of Loyalty" (1862), being suggestions in regard to the American colonies; "Remarks on the Loss of the 'Captain'" (1871); "Ashanti and the Gold Coast: A Sketch" (1873); "Lines from My Log-Books" (1898).

Hay Asthma. See HAY FEVER.

Hayden, Ferdinand Vandeveer, an American geologist; born in Westfield, Mass., Sept. 10, 1829. He was graduated at Oberlin in 1850. He was surgeon of volunteers in the Civil War, and was brevetted lieutenant-colonel. With the exception of the time spent in the army, he occupied the years from 1853 to 1879 in explorations in the Rocky Mountains and the adjacent country. He edited the first eight reports (1867–1876) of the United States geographical and geological surveys of the territories, and is the author of several works on explorations in the West. He was a member of the National Academy of Science, and of other foreign societies. He died Sept. 22, 1887.

Haydn, Joseph, a German musical composer; born in Rohrau, on the borders of Hungary and Austria, in 1732. On account of the excellence of his voice he was appointed a choir-boy at St. Stephen's Church, Vienna. At the age of 16 his voice began to break, and he lost his situation as a chorister. Having made the acquaintance of Metastasio, Porpora, and Gluck, Haydn gradually attracted public attention, was appointed organist to two churches, and obtained many pupils. From 1761 to 1790 he was musical director to Prince Esterhazy, and composed during this period a great number of works, including some 120 symphonies for the orchestra, 12 operas, etc. In 1791 and 1794 he visited England, staying there nearly three years altogether, and writing his opera "Orpheus and Eurydice." In 1798 he published his oratorio of the "Creation," and in 1800 that of the "Seasons." His old age was exempt from pecuniary troubles, and he was surrounded by appreciative friends. His last public appearance was at a performance of his "Creation" in 1808. Haydn's principal merit consists in his opening up a new development of instrumental composition, of which his 125 orchestral symphonies furnish abundant proof. He may be said to be the originator of the symphony and of the stringed quartette. He died in 1809.

Haydon, Benjamin Robert, an English historical painter; born in 1786. He produced many pictures of merit; among them the "Judgment of Solomon"; "Christ's Entry into Jerusalem"; "The Raising of Lazarus"; "The Mock Election in the King's Bench"; "Napoleon at St. Helena"; "Alexander and Bucephalus"; "Alfred and the Trial by Jury"; "Uriel and Satan"; "The Burning of Rome"; etc. He died in 1846.

Hayes, Augustus Allen, an American chemist; born in Windsor, Vt., in 1806. He studied chemistry under Dana. He discovered the organic alkaloid sanguinaria, carried through experiments which led to the construction in 1838 of improved furnaces and boilers, suggested the process of reducing pig to malleable iron without loss by the use of the oxides of iron, as well as new processes in copper-smelting, the decomposition of alcohol, and the formation of chloroform, and made important investigations into the properties of guano. He also examined the constitution of seawater and fresh water at various depths, prepared a report for the navy department on the copper-sheathing of vessels, and supplied a novel process for the manufacture of saltpeter. Hayes was for many years state assayer of Massachusetts, and died in Brookline, Mass., June 21, 1882.

JOSEPH HAYDN.

Hayes, Isaac Israel, an American Arctic explorer; born in Chester county, Pa., March 5, 1832. He was graduated in medicine at the University of Pennsylvania in 1853, and sailed as surgeon in the Kane expedition in search of Franklin. The story of his attempt to reach Upernavik in 1854 is told in "An Arctic Boat-journey" (1860). In 1860–1861 he conducted a second expedition to the Arctic regions, and in 1869 he again visited Greenland. His third voyage is described in "The Land of Desolation" (1871). He was surgeon of volun-

teers from 1862 to 1865, retiring with the brevet rank of lieutenant-colonel; and he served in the New York Assembly for five years. His Arctic work was recognized by medals from the London and Paris geographical societies. He died Dec. 17, 1881.

Hayes, Rutherford Birchard, an American statesman; 19th President of the United States; born in Delaware, O., Oct.

RUTHERFORD B. HAYES.

4, 1822. His father died before his birth, leaving the family in comparative poverty. He was able, however, to be educated, first at the common schools, then in Latin and Greek with Judge Sherman Finch, of his native town, later in an academy at Norwalk, O., and in a school at Middletown, Conn. From here he entered Kenyon College at Gambier, O., and was graduated as valedictorian in 1843. He then took a course in Harvard Law School, and in 1845 was admitted to the Ohio bar. His health failing, he spent a winter in Texas, for the purpose of restoring it, in which he succeeded. By the advice of friends he established himself, on his return, in Cincinnati, where he won respect and success among the ablest men of his profession in the State. In 1852 he married Lucy, daughter of James Webb, of Chillicothe, O., a physician of repute. In 1858 he was elected city solicitor of Cincinnati, first by the city council, and then by popular vote. His affiliations were with the Whig party till the Republican party arose, after which he was steadily a Republican. On the outbreak of the war he received a commission as major of the 23d Ohio regiment of infantry, and was soon promoted to the rank of lieutenant-colonel. He distinguished himself at the battles of South Mountain, of Cloyd Mountain, the first battle of Winchester, at Berryville, Fisher's Hill, and Cedar Creek. After the latter engagement he was promoted to the rank of Brigadier-General. In 1864, while still serving in the field, he was elected to Congress from Ohio, and reëlected in 1866. He supported the impeachment of Andrew Johnson.

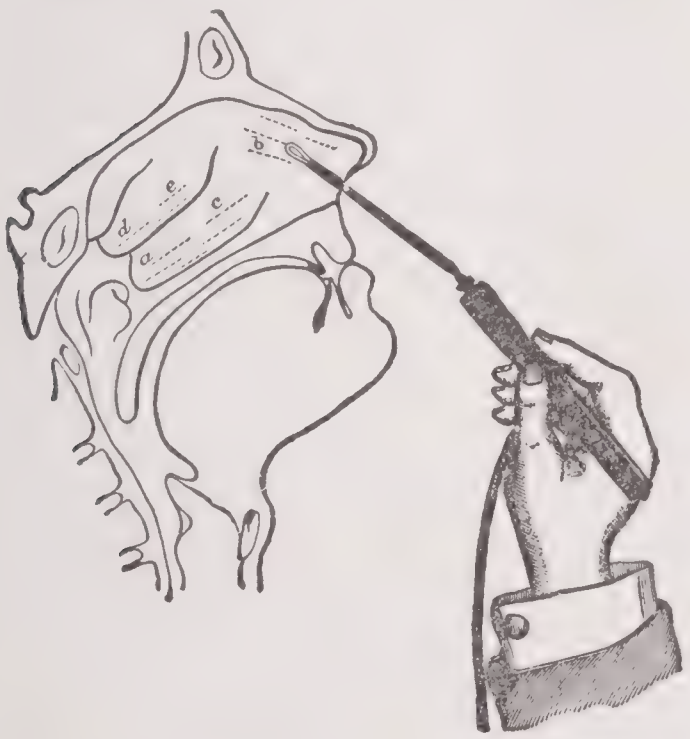
In 1867 he was elected governor of Ohio and reëlected 1869, in which office his administration attracted national attention for its sound and progressive measures. He declined several offices after retiring from the governorship, but in the greenback contest of 1875 he was nominated and elected as the sound-currency candidate for the governorship. This victory determined the Republicans of his State to present him as their candidate at the National Convention of 1876, where he was nominated for the presidency against J. G. Blaine, O. P. Morton, B. H. Bristow, and other popular candidates. The election came into dispute, both parties claiming the electoral votes of Louisiana, Florida, Oregon, and South Carolina. The contest was left to a special commission of 15, who decided by a vote of 8 to 7 that all of the votes in question should be counted for Hayes, and for his colleague for Vice-President, Wheeler, thus giving him the presidency. The popular plurality, however, was against him. His administration was characterized by the resumption of specie payment, the inauguration of civil-service reforms, the restriction of Chinese immigration, and reconstruction measures for the South. The satisfaction of the country in general with his administration was mingled with much criticism, especially as to his attitude relative to the employment of military force at elections, and for his appointment to office of members of the Louisiana returning boards. On his retirement he served on the boards of various benevolent societies and educational institutions, and was honored with degrees from Kenyon College, Harvard, Yale, and Johns Hopkins. He died in Fremont, O., Jan. 17, 1893.

Hayesine, also called BORATE OF LIME and ULEXITE, is a boronatrocalcite, a double salt of sodium and calcium, found in Peru, Chile, etc., and is a source of boracic acid.

Hayes River, or **Hill River,** a river of British North America, rising near Lake Winnipeg, and flowing N. E. through lakes Holy, Knee, and Swampy, enters James Bay at York. Length, about 300 miles.

Hay Fever, a catarrhal affection of the mucous membranes of the eyes, nose, mouth, pharynx, larynx, and bronchi, accompanied by difficult breathing, induced by the action of the pollen of various plants, chiefly of the *Graminaceæ* prevalent during the hay season, but subsiding at its close, and varying in its severity according to certain atmospheric conditions and the amount of pollen in the air. The diagnosis is easy, as the occurrence of the catarrhal symptoms only

in summer separates it from an ordinary "cold in the head"; while their combination with difficulty of breathing in hay fever prevents it being mistaken for spasmodic asthma arising from other causes, in which there is usually no catarrh. Hay fever was attributed to local chronic disease of the naso-pharyngeal mucous membrane by Daly in 1882. In 1883 Roe advocated the same theory, and suggested the removal of the diseased tissue. In the same year Sajous advanced the theory that three conditions are essential: (1) an external irritant, (2) a predisposition of the system to its influence, (3) a vulnerable or sensitive area, through which the system becomes influenced. In 1884 J. N. Mackenzie, of Baltimore, stated that "for a paroxysm of hay fever a certain excitability of the nasal cavernous tissue is necessary (brought about by a multitude of external



HAY FEVER.

Sensitive area, a, b, c, d, e.

irritating causes), plus an oversensitive state of the vasomotor centers."

Treatment.— Curative: (1) Removal of cause, as chronic inflammation of nasal mucous membrane, hypertrophy of same, polypi, deviated or thickened septum, etc.; (2) organic alteration of the surface of the membrane by galvano-cautery or of caustic acids, acetic acid combined with cocaine, carbolic acid. Palliative: Tonics, valerianate of zinc (1 or 2 grains), out-door exercise, and friction; cocaine (10 per cent. solution), locally, applied with a brush; ointment of benzolated oxide of zinc and vaseline, equal parts; ointment (oil of hamamelis 1 dram; vaseline 1 ounce); belladonna ointment, quinine spray, spray of bicarbonate of soda, or of borax (3 grains to the ounce of water). For the asthma, iodide of potash (5 grains with 5 minims of tincture of belladonna in syrup of orange-peel every two hours), inhalations of niter-paper, stramonium leaves, etc., with wine of cocoa internally.

Haygood, Atticus Green, an American Methodist clergyman; born in Watkinsville, Ga., Nov. 19, 1839. He became bishop in 1890. He wrote: "The Monk and the Prince," a study of Savonarola and Lorenzo de Medici; "Our Brother in Black" (1881); "Pleas for Progress" (1889); etc. He died in 1896.

Haymarket Square Riot, The, a riot which took place May 4, 1886, in Haymarket Square, in Randolph street, Chicago, when the police undertook to break up a public meeting of anarchists. A bomb was thrown by some person, supposed to be one Schnaubelt, who has never since been found. By this assault seven policemen were killed and 60 wounded. Of the anarchists captured, August Spies, Adolph Fischer, George Engel, and Albert R. Parsons were hanged Nov. 11, 1887; Louis Lingg, also convicted, killed himself in prison on the day before the execution; Samuel Fielden and Michael Schwab were sentenced to imprisonment for life, and Oscar Neebe was committed for 15 years. The last three were pardoned by Governor Altgeld. A monument marks the spot where the policemen fell. The anarchist sympathizers have erected a monument also.

Haynau, Julius Jakob, Baron von (hī'nou), an Austrian general; born in Cassel, Germany, Oct. 14, 1786. Entering the Austrian service in 1801, he signalized himself during the Italian campaigns of 1848–1849 by his ruthless severity, especially at the capture of Brescia, where his flogging of women and other atrocities gained him the name of the "Hyena of Brescia." Haynau was engaged in the siege of Venice, when he was summoned by the emperor to Hungary, in May, 1849, to take the supreme command of the forces in that country. The storming of Raab, his victory at Komorn, his occupation of Szegedin, and his victories on the Theiss contributed materially to the final success of the imperialists. But Haynau's atrocious severity toward the Hungarians excited detestation. Appointed dictator of Hungary, he was dismissed in 1850 on account of his cruel character. He died in Vienna, March 14, 1853.

Hayne, Isaac, an American patriot; born in South Carolina in 1745. After the capitulation of Charleston, he was compelled to subscribe a declaration of his allegiance to the King of Great Britain, provided he might not be ordered to bear arms against his countrymen. He was summoned, however, to the British standard. This he refused as a violation of the compact he had entered into, and hastened to the American

camp. Being shortly after taken prisoner by the English, he was tried and hanged, Aug. 4, 1781.

Hayne, Paul Hamilton, an American poet; born in Charleston, S. C., Jan. 1, 1830. At first a lawyer, he turned to journalism, and in 1855 his maiden volume of verse appeared. "Sonnets and Other Poems," followed it two years later, and then came "Avolio, a Legend of the Island of Cos." He served through the war, retired from the field in poverty, and wrote poetry. "Legends and Lyrics"; "The Mountain of Lovers"; "The Wife of Brittany"; and other productions of this period, mark him easily first among Southern poets. He died in Augusta, Ga., July 6, 1886.

Hayne, Robert Young, an American statesman; born in South Carolina in 1791; was admitted to the bar in 1812; served in the war with Great Britain; and at its close returned to his practice in Charleston. He was a member of the State Legislature in 1814–1818, and became speaker, was attorney-general of the State in 1818–1822, and sat in the United States Senate from 1823 to 1832. He was a vigorous opponent of protection, and in 1832 boldly supported in Congress the doctrine of Nullification. Daniel Webster's reply ranks among his ablest speeches. In November, 1832, South Carolina adopted an ordinance of nullification, in December Hayne was elected governor, and the State prepared to resist the Federal power by force of arms. A compromise, however, was agreed to, and the ordinance was repealed. Hayne died Sept. 24, 1839.

Haynes, Arthur Edwin, an American mathematician; born in Van Buren, N. Y., May 23, 1849; was graduated at Hillsdale College, in 1875, and became instructor of mathematics and physics there in the same year; professor in 1877–1890; held the same chair in Michigan Mining Schools in 1890–1893, and that of Mathematics at the University of Minnesota in 1893–1896, and in its Engineering Department in 1896–1901. He was the author of "The Desirability of Uniformity in the Use of Mathematical Symbols and Terms," etc.

Hays, Isaac, an American physician; born in Philadelphia, Pa., July 5, 1796; was graduated at the University of Pennsylvania in 1816, and at its Medical Department in 1820; became editor of the "American Journal of the Medical Sciences" in 1827, and in more than 40 years of work on that periodical gained a wide reputation. His code of ethics which he drew up for the American medical association was adopted by every State and county medical society in the United States. He died in Philadelphia, Pa., April 13, 1879.

Hayward, Abraham, an English essayist; born in Wiltshire, Oct. 31, 1802. He published in 1833 his excellent prose translation of the first part of "Faust," and soon became a busy contributor to the newspapers and magazines, especially the "Quarterly Review." Many of his best articles were reprinted in his "Biographical and Critical Essays"; "Sketches of Eminent Statesmen and Writers"; "Autobiography and Remains of Mrs. Piozzi," and "Selections from the Diary of a Lady of Quality." His little books — "The Art of Dining" (1852); "Lord Chesterfield" and "George Selwyn" (both in 1856); and "Short Rules of Modern Whist" (1878) — were widely circulated. In 1878 he published in two volumes his "Selected Essays." He died in London, Feb. 2, 1884.

Hazael, an officer of Benhadad, King of Syria, whose future accession to the throne was revealed to the prophet Elijah (I Kings xix: 15). Many years afterward he was sent by Benhadad to consult Elisha, then at Damascus, as to his recovery from sickness, and on the next day smothered the king with a wet cloth (II Kings viii: 7–15), 885 B. C. Having usurped the throne, he reigned 40 years; and by his successful and cruel wars against Judah and Israel justified the forebodings of Elisha (II Kings viii: 28; x: 32; xii: 17; xiii: 3, 7; II Chr. xxii: 5).

Hazard, a game with two dice. The "caster" calls 5, 6, 7, 8, or 9 for the main. He then throws. If he throws the number called, or if he throws 12 when 6 or 8 is the main, or 11 when 7 is the main, he nicks, and wins of his opponent (named the "setter"). If he throws 2, 3, 11, or 12 when 5 or 9 is the main, or 2, 3, or 11 when 6 or 8 is the main, or 2, 3, or 12 when 7 is the main, he loses. If he throws any other number — thus, when 7 is the main, if he throws 4, 5, 6, 8, 9, or 10 — it is called his "chance." He then continues to throw till either the main or the chance is thrown. If the main is first thrown, the setter wins; if the chance is first thrown, the caster wins.

Hazel (*Corylus*), a genus of shrubs or small trees of the order *Corylaceæ* or *Cupuliferæ*. It belongs to Europe, North Africa, Asia, and North America. The leaves are roundish-cordate, alternate, and shortly petiolate. The European hazel (*C. Avellana*) produces the nuts called filberts, and grows best in a tolerably dry soil. It bears male and female flowers, the former composing cylindrical catkins. The hazelnut oil is little inferior in flavor to that of almonds. Hazel branches form excellent walking-sticks, fishing-rods, etc., and the wood produces good charcoal, often employed by painters. The American hazel (*C. americana*) very much resembles the European. The roots are used by cabinet

makers for veneering; and in Italy the chips are sometimes put into turbid wine for the purpose of fining it.

Hazel Grouse (*Bonasa betulīna*), a species of grouse inhabiting the continent of Europe and great part of Asia, allied to the ruffed grouse of the United States.

Hazeline, an alcoholic liquid distilled from the fresh leaves of the *Hamamelis virginica*, the witch-hazel, native to the United States. It is exceedingly useful as an application to wounds, stanching the bleeding and promoting healing. It is equally useful for bruises, inflammatory swellings, sprains, and the like. It is applied on a pledget of lint to bleeding piles. In internal bleeding, whether from the lungs, stomach, or bowels, it gives very satisfactory results. There are several officinal preparations of the witch-hazel, a fluid extract and a tincture, the dose of the former being 15 to 60 drops, and of the latter two to five. Hazeline is the name given to a clear colorless liquid prepared by certain chemists, but not officinal, of which a teaspoonful may be given.

Hazeltine, Mayo Williamson, an American journalist; born in Belfast, Me., in 1841. Originally a lawyer, he was long well known as literary editor of the New York "Sun." He published: "The American Woman in Europe"; "British and American Education"; "Chats about Books"; etc. He died Sept. 14, 1909.

Hazen, William Babcock, an American military officer; born in West Hartford, Vt., Sept. 27, 1830; was graduated at the United States Military Academy in 1855; served with marked distinction during the Civil War; was promoted Major-General of volunteers on Dec. 13, 1864, on which day he captured Fort McAllister, and colonel United States army, in 1866; observed the Franco-Prussian War on French territory, and was United States military attaché at Vienna during the Russo-Turkish War. His publications include "The School and the Army in Germany and France, with a Diary of Siege-Life at Versailles" (1872); "Barren Lands of the Interior of the United States" (1874); and "Narrative of Military Service" (1885). He died in Washington, D. C., Jan. 16, 1887.

Hazleton, a city in Luzerne co., Pa., on the Pennsylvania and the Lehigh Valley railroads; 115 miles N. W. of Philadelphia. It is the center of a Lehigh anthracite coal region, with 40 mines in the vicinity. Besides its coal mining and shipping interests, the city has railroad shops, iron works, and extensive manufactures of flax, beer, brooms, silk, macaroni, chewing gum, and coffins. It is the seat of the State Hospital; has electric lights and street railways, public high school, Hazleton Seminary, daily and weekly newspapers, 2 National banks, and an assessed property valuation of $4,500,000. Pop. (1890) 11,872; (1910) 25,452.

Hazlitt, William, an English critic; born in Maidstone, Kent, England, April 10, 1778; became a student in the Unitarian College in Hackney in 1793, but devoted more time to literature and art than to theology; and on leaving college engaged in portrait painting. In 1805 he began his literary career with an essay, "On the Principles of Human Action." This was the germ of a long and successful career, during which he gave to the world "Lectures on the Literature of the Elizabethan Age"; "Lectures on the English Poets"; "Life of Napoleon Bonaparte"; "Characters of Shakespeare's Plays"; "Lectures on the English Comic Writers"; "A View of the English Stage"; "Table Talk"; etc. His "Lectures" were delivered before the Russell and the Surrey Institutions. The "Essays," written in conjunction with Leigh Hunt, to the "Examiner," were published under the title of "The Round Table" in 1817. He was a good art critic, but his tendency to prejudice and paradox, and his almost contemptuous regard for the productions of contemporary genius, render him a less safe authority than his knowledge and talents would lead us to expect. He died in 1830.

Hazlitt, William Carew, an English author; born in London Aug. 22, 1834; brought up as a civil engineer, relinquished that profession for journalism, and finally adopted literature and archæology. Among his works may be mentioned: "History of the Venetian Republic" (1860); "Warton's History of English Poetry"; "Bibliographical Collections and Notes" (1876–1892); "The Livery Companies of London" (1892); a new and enlarged edition of Dodsley's "Old Plays"; "Memoirs of William Hazlitt" (1897); "Four Generations of a Literary Family" (1897); "Leisure Intervals," poems (1897); "Ourselves in Relation to a Deity and a Church" (1897); "Coins of Europe" (1893–1897).

Head. When the anterior part of the body of an animal is marked off by a difference in size, or by a constriction (neck), it is called head. The presence or absence of a head was formerly much used as a character in classification. Thus Latreille divided animals into the headless, *Acephala*, and those provided with a head: and these again formed two groups, the *Vertebral* animals, with heads properly so called, and *Cephalidia*, with small, indistinct heads. But this classification would separate the oyster and all other lamellibranch mollusks from the snail, cuttlefish, etc.; it is, in fact, an artificial character. The mouth

Head

and principal nervous organs are the guides to the anterior end of the body, where the head, when recognizable, is situated. In the *Protozoa*, *Infusoria* and *Cœlenterates*, such as the hydra and corals, there is no nervous ganglion, and the mouth is not surrounded by special structures. In the inferior *Vermes* the anterior end becomes marked by the presence of ganglia, though the mouth may be at some distance from it. The so-called head of parasitic animals, such as the tapeworm, is only the end of attachment, the globular hook-bearing mass being headlike on a long neck, but neither mouth nor ganglia exist in it. In the *Polyzoa*, lampshells, ascidians, and lamellibranch mollusks, mouth and ganglia exist, but they are not surrounded by special structures. But in the worms proper, the articulated animals (crustaceans, myriapods, spiders, and insects), the land and fresh water gasteropods (snails and whelks), and the cuttlefishes, a head proper is found. That is, the mouth with the anterior nervous ganglia, and some at least of the sense organs, are placed in a segment of the body which, either by structure or by structure and appearance, is different from the rest. Thus in the worms and articulated animals some of the rings or articles of which the body is made up are fused together, the appendages being not walking limbs, but modified into jaws or jaw-like organs. Thus the common shore worms possess a structural head, though it is not apparent. The head is best defined in the insects, as in the housefly, where it is separated by a slender neck from the thorax. The snail's head has its cavity shut off by a diaphragm from the rest of the body cavity, and contains the denticulate lingual ribbon or tongue, with the muscles which work it, while the antennæ and eyes appear on the surface. The cuttlefishes have, in addition, a remarkable cartilaginous box, which, like a skull, protects the ganglia and gives support to the muscles.

The head of the vertebrated animals presents a regular series of increasing complexity from the lancelet (*Amphioxus*) upward. In that fish the most anterior part of the nervous cord is lodged in a canal scarcely distinct from that which contains the rest of it. Ascending in the series, it becomes evident that as the anterior nervous mass enlarges, and its ganglia increase in complexity, the anterior vertebræ change their character; as the brain becomes specialized, so does the brain case or skull. In man the brain attains its highest development and the head its greatest complexity, the difference between skull and face being now most pronounced.

The vertebrate theory regarding the skull, which was propounded originally by Goethe, is now accepted to this extent, that the skull or cranium consists of three vertebræ, which are recognizable in the fish, and that the facial bones are not vertebræ, but developed from cartilage which did not form an original part of the vertebral column. A vertebra consists of a body or center, from which two processes arch upward and close in the spinal canal with its contents, the spinal cord; while lateral processes give attachment to ribs, and indirectly to limbs. The posterior cranial vertebra is the occipital, consisting of a center, the basioccipital bone, two lateral pieces, exoccipitals, and a superior supraoccipital; the next is the parietal, of which the basisphenoid is the center, and the great wings of the sphenoid and the parietals the lateral arches; the most anterior is the frontal, with its center, the presphenoid, and its arch, formed by the orbital plates of the sphenoid and the frontals. The centers of the spinal vertebræ are ossifications around a fibro-cartilaginous rod, the chorda dorsalis, which ends in the basisphenoid.

Up to this point the spinal column and skull have a common base; but the spinal vertebræ were preceded by, and are in fact modifications of primitive vertebræ, and no representatives of these appear in the development of the skull. It is therefore open to question whether the three divisions just mentioned are really vertebræ, or should not rather be called cranial segments. There is the more reason for this that in fishes the basisphenoid and presphenoid are represented by a single bone, the parasphenoid, which underlies the skull, but disappears in the higher vertebrates, and that the presphenoid is not properly connected with the chorda dorsalis, but rather belongs to the series of facial bones. The pituitary body which projects from the lower surface of the brain lies in front of the end of the chorda dorsalis: from this latter rod and its surroundings a plate of cartilage passes forward on either side of the pituitary body, and these (the *trabeculæ*) meeting in front of that body, form the cartilaginous axis around which the vomer, ethmoid, and other facial bones are developed, while the presphenoid is an ossification in this axis

Nasal.	Frontal.		Parietal.		Occipital.	
Nose.	Frontals.	Eye.	Parietals.	Ear.	Supraoccipital.	*Arches.*
Ethmoid and Prefrontal.	Orbitosphenoids.		Alisphenoids.		Exoccipitals.	
		Pituitary.				
Vomer.	Presphenoid.		Basisphenoid. Parasphenoid.		Basioccipital.	*Centra.*

Mouth. Upper jaw. Lower jaw.

Suspensorium.

Hyoid.

just where the two portions meet in front of the pituitary. The sense organs, the ear and the eye, are, so to speak, lodged in capsules of bone which are inserted, the ear between the occipital and parietal, the eye between the parietal and frontal segments. They are accidental, not essential parts of the cranium. The hyoid apparatus and the lower and upper jaws are developed from the cartilaginous walls of the embryonic skull, and the jaws come in a secondary manner to take part in the composition of the face. The increasingly globular form of skull in the vertebrates is due to the greater increase of the cerebral hemispheres relatively to that of the base of the brain and axis of the skull: hence the brain comes in man to overhang the face.

Of course it should be remembered that while in the vertebrated animals the head is divided by its axis (commencing at the middle line of the upper jaw, and passing backward through the basisphenoid to the vertebral center) into an upper chamber, lodging the brain, and a lower, lodging the first part of the alimentary canal; in the lower animals the cavity is a single one, the œsophagus piercing the nervous system so as to reach the surface of the body, and thus coming to be surrounded by a pair of ganglia above and a pair below, with the filaments connecting these ganglia. In the vertebrate the head is curved downward, the basisphenoid being the pivot point, so that the mouth is pushed to the lower surface; in the lower animals the under surface of the body curves upward in order to carry a part of the nervous system beyond the mouth toward the upper surface of the body.

Head, Barclay Vincent, an English numismatist; born in Ipswich, England, in 1844. He entered the British Museum in 1864; became assistant keeper of the Coin Department in 1871, and keeper in 1893. He made a special study of ancient Greek coinage, and was the first to methodize the science of Greek numismatics by introducing a chronological system of classification. His works include: "History of the Coinage of Syracuse"; "Guide to the Principal Gold and Silver Coins of the Ancients"; both crowned by the French Institute; "Historia Numorum," a complete illustrated historical manual of the whole science of Greek numismatics.

Head, Sir Edmund Walker, an English statesman; born in Maidstone, England, in 1805; was educated at Oxford University; lieutenant-governor of Nova Scotia in 1847–1854 and governor-general of Canada in 1854–1861. His administration was marked by the choice of Ottawa as the capital of Canada, by the visit of the Prince of Wales in 1860, and by several other important events. He was the author of "Shall and Will"; "Hand-Book of the History of the Spanish and French Schools of Paintings" (1848); and "The Temple of Serapis at Pozzuoli" (1858). He died in London, England, Jan. 28, 1868.

Head, Sir Francis Bond, an English author; born near Rochester, England, Jan. 1, 1793; joined the army early in life; served in the corps of engineers during the campaign under Wellington; led an expedition to work the gold and silver mines on the Rio de la Plata in South America in 1825; retired in 1828; and was lieutenant-governor of Upper Canada in 1835–1837. His publications include "Life of James Bruce" (1830); "The Emigrant" (1846); "The Defenceless State of Great Britain" (1850); "A Fortnight in Ireland" (1852); "The Horse and His Rider" (1860); "Sketch of the Life of Field-Marshal Sir John Burgoyne"; etc. He died in Croydon, England, July 20, 1875.

Head, Sir George, an English writer of travels; born in 1782. He held various posts in the army and was present at most of the great battles of the Peninsula. In 1814 he proceeded to Canada to be chief of the commissariat of a proposed navy on the Canadian lakes, and subsequently published his experiences in "Forest Scenes and Incidents in the Wilds of North America." He was knighted in 1831. He also wrote "Rome," "A Tour of Many Days," translations of Pacca's Memoirs, and of Apuleius, with other works. He died in 1855.

Headache, an ache in the head arising from a variety of causes. The principal forms it assumes are: (1) Congestive headache, arising from over-fullness of blood. It may be cured by purgatives, while reduction of the diet and saline medicines are beneficial. (2) Anæmic headache, which arises from a deficiency of blood, and occurs in persons badly fed or in weak girls. Good food and iron tonic, with application of cold to the head, are often of service in such cases. (3) Nervous headache, which often attacks the studious, and which is relieved by nerve tonics, and especially by phosphorus pills. (4) Neuralgic headache, which is often due to exposure to cold. What is called hemicrania or megrim, which is the limitation of the headache to one-half or less of the head, is often treated with bromide of potassium. In cases in which headache arises from disease of the liver, nausea results, and this characterizes bilious headache. Impurity of blood and gouty affections, as well as disease of the kidneys, are frequent sources of headache.

Head Hunters, in anthropology, a name given to several races or tribes, notably to the Dyaks and Kyans of Borneo and Celebes,

on account of their savage mania of hunting for heads, generally by nocturnal ambuscades, and treasuring them as trophies. Tylor connects the barbarous custom with the rite of funeral human sacrifice, and says that the Dyaks considered that the owner of every human head they could procure would serve them in the next world, where their rank would depend on the number of heads they had taken in this. The present of a head is exacted from every aspirant to a Dyak bride. The influence of Sir James Brooke did a great deal to discourage head-hunting and it is now disappearing. Kean says that the practice also exists, with almost identical circumstances, among the wild Kirkis, Nagas, and Garos of the E. frontier of Bengal, while traces of it are found among the Baltaks and some other races of the Indian Archipelago.

Headley, Joel Tyler, an American prose-writer; born in Walton, N. Y., Dec. 30, 1813. Graduating from Union College in 1846, he became assistant editor of the New York "Tribune." His writings had great currency in their day, and include: "Napoleon and his Marshals" (1846); "Washington and his Generals" (1847); "Grant and Sherman, their Campaigns and Generals" (1865); and "The Great Rebellion" (1864). He died in 1897.

Headley, Phineas Camp, an American Congregational divine; born in Walton, N. Y., June 24, 1819. He wrote: "Women of the Bible" (1850); "Lives" of Josephine (1850), Kossuth (1852), Lafayette (1855), Mary Queen of Scots (1856), etc.; "Heroes of the Rebellion" (Grant, Ericsson, Farragut, Sherman, etc.); "Court and Camp of David"; etc. He died Jan. 5, 1903.

Head Money, a tax of 50 cents imposed by act of Congress, Aug. 3, 1882, on every immigrant brought to the United States. Previous to the passage of this act the State of New York levied a "head tax" on all immigrants arriving at New York, the funds going to the support of the State board of immigration. A test of the legality of the tax being made in the courts, a decision was rendered that the New York statute was void because it infringed on the prerogatives of national government. Subsequently the act of Congress imposing the tax was questioned in the United States Supreme Court, and a decision affirming the constitutionality of the law was made. The national act provides that the tax shall be paid—by the master or owner of the vessel bringing the immigrants—to the collector of the port, and by him turned over to the treasury of the United States, to be used by the secretary to defray the expenses of regulating immigration and to relieve such immigrants as are in distress. The act also empowered the Secretary of the Treasury to contract with State officers to take charge of the local affairs of immigration within such State.

Health, that condition of the living body in which all the bodily functions are performed easily and perfectly and unattended with pain. The most perfect state of health is generally connected with a certain condition of the bodily organs, and well marked by certain external signs. The various influences affecting health are dealt with under the names of the bodily organs, diseases, etc., and other appropriate headings.

Health, Bill of, in shipping, a document carried by a ship, unless engaged in the coasting trade or specially exempted. It is granted abroad by the consul or consular agent, or, if there is no such person, by a foreign consul. When no contagious or infectious disease is known to exist at the place of departure, the bill is "clean"; when there is reason to fear the appearance of such disease, the bill is "suspected"; when such disease exists, it is "foul."

Health, Municipal Boards of, in the United States, institutions organized under city government, and deriving powers from State laws for the purpose of protecting the health of the citizens. Every city of importance has a municipal board of health.

Health, State Boards of, institutions established by State legislative enactments, intended to have a central advisory relation with local sanitary organizations, and to superintend a State system of vital statistics. They have been created in nearly all the States and in the District of Columbia.

Health Resorts, frequented for combating disease or invigorating the comparatively healthy, fall into several well-marked groups. (1) Sea-bathing quarters have long been in vogue among civilized nations, though the periodical exodus from cities is of modern origin. (2) The remedial and invigorating agency of mountain air has been more recently recognized, but is now fully established. Hence the popularity of many inland highland districts in Scotland, Switzerland, and Norway. (3) Curative wells—thermal, muriated, alkaline, sulphated, chalybeate, sulphurous, calcareous—have been frequented from the earliest times, and are found in many countries. (4) Climatic health resorts at a high altitude have of late come into favor because of their value for persons recovering from acute illness, and who are able to take active outdoor exercise; and specially for those in the early stages of phthisis, or in chronic phthisis unaccompanied by fever or blood-spitting. When there is hæmoptysis, such a climate is disadvantageous or dangerous—as it is also in cases of heart disease, chronic bronchitis, and chronic rheumatism. (5) Residence for longer or shorter times in exceptionally temperate, mild, or

warm climates is recommended for pulmonary diseases, particularly phthisis. Florida, Southern California, and the pine-woods of Georgia are in favor with Americans. The climate of Colorado, bracing though not altogether mild, is also beneficial to bronchial and pulmonary weakness. Favored regions are Bournemouth, Torquay, and other places on the S. coast of England and the Isle of Wight, the Riviera (Mentone, Nice, Hyères, etc.), Pozzuoli and other sheltered places in S. Italy, Palermo, Madeira, Algiers, and Upper Egypt. In hot countries the sanatoriums are usually cool hill-stations—thus, in India, Simla, Darjiling, Naini Tal, Ootacamund, Pachmarhi. (6) Climatic resorts where additional help is obtained for special treatment—such as the grape cure in phthisis (Meran), whey cure (Gais in canton Appenzell), and the goat's milk, ewe-milk, or cow's milk cure. The influence of the pine-woods at Arcachon is supposed to be favorable to consumptive patients. Also such special devices as warm mud baths or the sun-bath cure (exposure of the uncovered person to the sun's heat and light), as practised at Veldes in Carniola. (7) Hydropathic establishments generally. (8) Sea-voyages may also be here noted, as suitable for persons in the early stages of phthisis and in cases of nervous exhaustion.

Healy, Timothy Michael, an Irish political leader; born in Bantry, County Cork, Ireland, May 17, 1855; took an active part in the Land League agitation and was almost continuously in Parliament after 1880. He wrote "A Word for Ireland," and text books on the Land Acts. He took a prominent part in the struggle against Parnell's leadership, and was recognized as one of the ablest members of the Irish party.

Heard, Franklin Fiske, an American jurist; born in Wayland, Mass., Jan. 17, 1825; was graduated at Harvard College in 1848; admitted to the bar in 1850; settled in Boston in 1855. His publications include: "Libel and Slander" (1860); an edition of "Stephen on Pleading" (1867); books on "Criminal Pleading" (1879) and "Civil Pleading" (1880); "Heard on Criminal Law" (1882); "Precedents of Equity Pleadings" (1884); "Precedents of Pleadings in Personal Actions in the Superior Courts of Common Law" (1886); etc. He died in Boston, Sept. 29, 1889.

Hearing. See AUDITORY; EAR; SOUND.

Hearn, Lafcadio, an American author; born in the Ionian Islands, June 27, 1850. He was the son of an Englishman and a Greek woman; was educated in England and France, and resided in the United States, where he engaged in journalism, and in Japan, teaching in the University of Tokyo. He wrote: "Some Chinese Ghosts" (1887); "Two Years in the French West Indies" (1890); "Youma" (1890); "Glimpses of Unfamiliar Japan," and other books on Japan. His last book, "Japan: an Interpretation" (1904), is his most remarkable study of the Japanese. He died in Tokyo, Sept. 27, 1904.

Hearn, David William, an American clergyman and educator; born in Boston, Mass., Nov. 21, 1861; was graduated at Boston College in 1880; took post-graduate courses in literature, science and philosophy for five years, and theological courses for four years; later studied at Woodstock College, Maryland, and in Europe; and was ordained in the Roman Catholic Church. He was at different times professor in Georgetown University, vice-president of Boston College, and of the College of St. Francis Xavier, New York, and became president of the latter college in 1900.

Hearsay Evidence. See EVIDENCE.

Hearst, Phœbe Apperson, an American philanthropist; born in 1840; taught for a time, and in 1861 married George F. Hearst, late U. S. Senator from California, who died in 1891. Among her many philanthropic works those performed in the interest of education are especially of public importance. She has established kindergartens and training schools in San Francisco and Washington, D. C.; has made donations to the American University, Washington; gave a large sum to build the National Cathedral School for Girls; established working girls' clubs in San Francisco; built and endowed free libraries in various mining towns; and maintains a school for mining engineers at the University of California (*q. v.*), an institution that owes much to her generosity.

Hearst, William Randolph, an American newspaper publisher and politician; born in San Francisco, Cal., in 1863, son of George F. and Phœbe Apperson Hearst; educated in the public schools and at Harvard University. He is the publisher of "the greatest chain of newspapers in the United States." In 1886 his father bought for him the San Francisco "Examiner," a moribund publication, and at once he began the introduction of novel features that have made him conspicuous in the field of journalism and have been more or less imitated in many parts of the world. The other newspapers that he has bought or founded, and now publishes, are: New York "Journal" (morning edition called "American"), Chicago "American" (morning edition called "Examiner"), Boston "American," and Los Angeles "Examiner." In political affairs he has not confined himself to newspaper discussion, but has taken part personally, having been elected to Congress as a Democrat in 1902, and reëlected in 1904, to represent the eleventh New York (city) district. In 1905 he was the candidate of the Municipal Ownership League for mayor of New York, and was defeated by George B.

McClellan. In 1906 he was a candidate for governor of New York, and was defeated by Charles Evans Hughes (*q. v.*), the plurality being 57,897.

Heart, a hollow muscular organ, the function of which is to maintain the circulation of the blood. The organs of circulation are the heart, the arteries, the veins, and the capillary vessels. The blood is either arterial or venous, according to the relative proportions of oxygen and carbonic acid gas it contains. The venous blood which has returned to the right side of the heart rrom the body, is propelled along the pulmonary art ry by the contraction of the heart into the lungs, where by the absorption of oxygen and the giving off of carbonic acid gas it becomes arterial blood, which then is conveyed along the pulmonary veins to the left side of the heart, and is thence distributed throughout the body to nourish it and repair its losses. The heart is composed of four cavities, two auricles and two ventricles. It is enveloped in a membrane called the pericardium, situated toward the left of the cavity of the chest, between the lungs, and resting on the diaphragm. Its form is that of a cone flattened on its inferior and superior faces. The right auricle communicates with the right ventricle, besides which there are in it three openings, that of the vena cava inferior, that of the vena cava superior, and that of the coronary vein. The communication between this auricle and ventricle is closed by a valve of three flaps when the ventricle contracts. The right or pulmonary ventricle communicates with the pulmonary artery which also is provided with a valve of three flaps. When these flaps are brought together they interrupt the communication between the ventricle and the artery. The left auricle communicates with the left ventricle and contains also the orifices of the four pulmonary veins. The left ventricle, besides the communication with the left auricle, which is guarded by a valve of two flaps, contains the orifice of the aorta, guarded also by a valve similar to that of the pulmonary artery. The ventricles are divided from each other by a fleshy wall, called the septum cordis. The valves at the openings of the arteries are called semilunar, that at the orifice of the right auricle tricuspid, that at the orifice of the left auricle mitral, and that at the orifice of the vena cava inferior the Eustachian valve.

The heart is formed of a firm thick muscular tissue, composed of fibers interlacing with each other, so as to form a figure 8 It also contains nerves and vessels. The coronary arteries arise from the aorta and are distributed on the heart. The coronary veins return the blood of the heart into the right auricle. The arteries (from the Greek, *aer,* air, and *terein,* to preserve, because they were thought to contain air) are the vessels which serve to carry the blood from the heart to all parts of the body. They terminate in the capillary vessels, a series of extremely minute vessels which pass over into the veins. The veins are the channels by which the blood passes back from the body into the auricles of the heart. The blood which is returned from the veins is dark and is called venous; that which leaves the heart is bright scarlet and is called arterial. The venous blood having parted with carbonic acid and acquired oxygen in the capillary system of the lungs, flows into the pulmonary veins, thence is received into the left cavities of the heart, from which it passes into the aorta. From the aorta it is distributed by branches — arteries — to every tissue and organ of the body, with few exceptions, the arteries dividing and subdividing till exceedingly minute vessels — arterioles — are reached. The arterioles finally pass into exceedingly thin-walled vessels, the capillaries, which pervade every part of the tissue or organ. Through the thin walls of the capillaries, fluid — plasma — of the blood, passes to bathe the tissues. But the blood stream, thus brought into contact with the tissues, not only gives up to them oxygen and nutritive material, but receives waste products, among them carbonic acid gas, which are removed from the tissues in its current. The capillaries are not only the terminations of the arteries, but also the commencement of the veins. Gradually they unite to form larger vessels, minute veins, which again uniting form larger veins, and so on, by which the blood is returned from the tissues, till the large trunks, vena cava inferior and superior, are formed, which enter the right auricle. In the tissues the blood has lost oxygen and gained carbonic acid gas, becoming venous, the reverse process to that which takes place in the lungs.

We will now explain the mechanism of the sanguineous system. The blood contained in the two venæ cavæ is poured into the right auricle, which contracts, and thus forces the fluid to escape; but the vena cava superior opposes to its passage the column of blood which it contains, the other veins are closed by valves, and it must therefore pass into the right ventricle. The ventricle then contracts, and as the tricuspid valve closes the passage through which the liquid entered, the blood is forced forward into the pulmonary artery, which recoils by its elasticity, and, its orifice being closed by the semilunar valve, propels the blood still forward into the capillary system of the lungs, whence it passes into the pulmonary veins, which pour it into the left auricle by their orifices. The contraction of the auricle impels it into the left ventricle, by

which it is in the same manner driven forward into the aorta (the mitral valve preventing its return into the auricle) and thence into the general circulation as above described. The mitral and tricuspid valves have tendinous cords — *cordæ tendineæ* — connected with the edges of the flaps, and these cords are attached to muscular projections (*musculi papillares*) of the inner wall of the heart, by means of which the valves are prevented from being forced upward too far. The two auricles contract and relax simultaneously with each other; as do also the two ventricles. The relaxation is called diastole; the contraction systole. It is difficult to determine what quantity of blood the heart projects at each systole. It is generally estimated at six ounces. The systole of the ventricles is the cause of the motion of the blood in the arteries, which also dilate with each wave driven into them by the motion of the heart and thereafter recoil by their elasticity, causing the pulse.

The heart is not the "center of the circulation"; it is the central contractile organ. The blood is developed in the embryo before the heart is formed. In the lower animals the circulation of a nutrient fluid precedes the formation of a heart. In *Protoza, Infusoria,* and those parasites which have no digestive canal, the soft tissues of the body are at once digestive and circulatory organs, the fluids being driven to and fro by the movements of the body. In *Cœlenterates, Echinoderms,* the lower *Vermes,* and some *Articulates* there is no true blood circulation; but water vessels discharge functions which are more comparable to those of respiration. In such cases the general cavity of the body contains a fluid which has passed by osmosis through the intestinal walls, and represents the products of digestion, its movements being determined by those of the body. The imperfect heart of the *Ascidians* or sea-squirts presents the rare phenomenon of alternate movement in opposite directions. In mollusks, as a rule, a ventricle and two auricles are present among the bivalves, two ventricles occurring in a few; in the gasteropods an auricle and ventricle; in the cephalopods the system is symmetrical. Among the annelids and articulates a dorsal vessel represents the central propulsive organ; the blood, however, on leaving this vessel passes into the interstices of the tissues, not being contained in definite vessels.

Heat, the name given to a peculiar sensation, and also to the agent by which that sensation is produced. The effects of heat on various kinds of matter are very remarkable, and will be described immediately; with respect to the sensation of heat, it may be observed that our sensations give us no indication whatever as to the absolute hotness or coldness of bodies, except when the temperature is so extreme as to cause pain, and that in that case the sensation of heat or cold is lost, intense heat or intense cold producing the same kind of pain. What our sensations do give us is, in the first place, a comparison between the temperature of the body which we touch and the temperature of the hand that touches it, a comparison which we get by noticing whether the hand is heated or cooled by contact with the foreign body; and in the second place, a means of comparing the temperatures of two bodies by touching first one and then the other, and noticing to which of them we lose heat, or from which of them we gain heat the faster.

We now proceed to consider the effects of heat on the various properties of matter, and to indicate where, according to the plan of this work, detailed information on points which can only receive a general mention here, may be found.

(1) One of the most important and obvious effects of heat is to alter the temperature of bodies. In almost all cases when heat is supplied to a body the temperature of the body rises, and when heat is removed the temperature of the body falls. Temperature is, in fact, the tendency that a body has to impart heat to other bodies; and when heat is supplied or removed from a body, that tendency is increased or diminished. Temperature is measured by thermometers of various kinds, of which a description will be found under that name. We have not yet considered how quantities of heat are measured. We may, however, say without going into that question, which is taken up below, that different bodies require very different amounts of heat in order to raise their temperature through the same number of degrees. In the first place, it requires twice as much heat to raise the temperature of 2 pounds of iron from 0° C. to 1° C. as it does to raise 1 pound of iron from 0° to 1°: and again equal quantities of different materials require different amounts of heat to raise their temperature through any given number of degrees. Thus it requires about 30 times as much heat to raise the temperature of 1 pound of water 1° as to raise the temperature of 1 pound of mercury by the same amount. The terms capacity for heat and specific heat are used in relation to the property of bodies now under consideration. The capacity for heat of a body or piece of apparatus is defined to be the quantity of heat required to raise the temperature of the body or piece of apparatus 1° from some fixed point, for instance, 1° from 0° C., or from 32° F. The specific heat of a substance is the ratio between the quantity of heat required to raise the temperature of the substance 1° from some fixed point and the quantity of heat re-

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quired to raise the temperature of an equal mass of distilled water 1° from 0° C.

(2) Heat also alters the dimensions of bodies. Increase of volume almost always results from addition of heat. There are only, in fact, three or four exceptions to this law. One of these is the well-known phenomenon presented by water between the temperatures of 0° C. and 4° C. Between these temperatures the volume of water decreases as the temperature rises. Above 4° C., however, its volume increases as the temperature rises. Thus, at 4° C. the volume of the water is a minimum and this point of temperature is called the point of maximum density for water. There are one or two other bodies which increase in volume on solidifying from their melted condition. Iron is one of these, and bismuth another; and it is this property that makes these bodies capable of affording sharp castings. There are also some crystals not belonging to the regular form, whose minor axes contract while their major axes expand. These are rare cases, however, and the almost universal rule is, that bodies expand with a rise of temperature. Taking the common scale of temperature, which practically makes the expansion of common air (and other gases) the measure of changes of temperature, it is found that between moderate limits bodies expand nearly regularly with the temperature; that is to say, that for a rise of two degrees they expand twice as much as for a rise of one degree. But if we take wider limits, 100° of temperature or more, changes in expansibility are noticeable by delicate experiments for every substance. Change of temperature also alters the elasticity of figure of solid bodies, an increase of temperature diminishing it in almost every case; and the elasticity of volume, that is, resistance to compression, is also altered, being increased as the temperature rises.

(3) Addition of heat liquefies solid bodies, and converts liquids into gases. This we have good reason to believe is an absolutely general rule, though we have not yet succeeded in liquefying all solids, or in liquefying and solidifying all gases, which is the reverse process. During the conversion of a solid into a liquid, or a liquid into a gas, a considerable quantity of heat is absorbed, and in the reverse process heat is given out; but this is one of the cases in which, though heat is taken in or given out, the temperature is not altered. Hence the heat is said to be made latent.

(4) Heat also alters the power of bodies for conducting electricity. In solids the conductivity is diminished to a great extent by an increase of a few degrees in the temperature. In liquids, on the other hand, increase of temperature increases the conductivity. The magnetic properties of bodies are also changed by heat. For example, an iron bar that has been magnetized suddenly loses the whole of its magnetism at a particular temperature, a temperature at which, it appears from recent observations, there is also a sudden alteration of volume. The magnetic susceptibility of iron is also altered by temperature to some extent. The optical properties of transparent bodies vary with the temperature; in liquids, at any rate, the refraction seems to decrease uniformly with the temperature, and so does the dispersion.

(5) Lastly we refer to the effects of heat in altering chemical properties of bodies. In some cases a very high temperature breaks up chemical compounds. In a strong solution of nitric acid, the nitric acid is decomposed by heat. On the other hand, increase of temperature, as a rule, favors chemical combination, as is seen when a spark is applied to a mixture of oxygen and hydrogen, where it causes their instantaneous combination.

We may now consider the measurement of quantities of heat. Almost any one of the various effects of heat might be made the basis of a system of measurement. For example, the unit quantity of heat might be chosen as that quantity which is required to melt a gram or a pound of some known substance, ice for instance. Indeed, this is sometimes used as a temporary unit: and Black, the discoverer of latent heat and of specific heat, did use it constantly, in consequence of his method of calorimetry. Our present science has, however, made our measurement of temperature so much more exact than any other measurements of the kind that we can make, that the unit quantity of heat is now defined by universal consent as the quantity of heat required to raise the temperature of a known body by a definite amount. For many reasons that will readily suggest themselves water is chosen as the substance for reference: and the unit quantity of heat is therefore defined (the Centigrade thermometer and metrical system being employed) as the quantity of heat which will raise the temperature of 1 gram of distilled water from 0° C. to 1° C. The unit quantity of heat may be otherwise defined, for example, one pound of water may be used instead of the gram and one degree Fahrenheit instead of one degree Centigrade. The reduction from one system to the other is, however, very simple. The definition given above is that which is now sanctioned by the best writers, and by committees of the scientific societies that have considered the question. Calorimetry is the technical name given to the part of the subject that deals with the practical measurement of quantities of heat.

The nature of heat was long a subject of active controversy. After the times of the alchemists and of those who held

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the phlogiston theory, the material theory of heat long held sway. Heat was considered to be a subtle imponderable fluid, permeating all matter, and was known under the name caloric. It was supposed that this fluid combining with the molecules of gross matter gave rise to the effects and phenomena observed; for instance, that a certain quantity of it entering into combination with the particles of a solid turned the solid into a liquid, or combining with the particles of the liquid converted it into a gas.

Doubtless the material theory was the more firmly held because the chemists were the cultivators of the science of heat, as of electricity; and it was natural to them to explain, if possible, the changes that they saw produced by heat as changes of the same nature with the chemical composition and decomposition that they were so familiar with. The great names of Black and of Lavoisier, too, gave popularity to the doctrine that they held; and the two grand discoveries of Black, of specific heat and latent heat, were so simply explained by the material hypothesis that the truth of the hypothesis seemed almost beyond question. The holders of the metrical hypothesis met, however, with one great difficulty in the fact of the production of heat by mechanical means, for example, by the friction of two solid substances. To explain it they were forced to resort to the supposition that the effect of the friction was to alter the capacity for heat of one or both of the substances. Black, indeed, brought forward a striking experiment in support of this supposition, showing that a piece of soft iron that has once been heated to redness by hammering, cannot again be heated in that way to the same extent without being previously exposed to a red heat in the furnace and allowed to cool. An experiment like this was, in fact, strongly in the favor of the calorists, as those who held the material theory were subsequently called, for in this case the heat seemed actually to be squeezed from the iron as water from a sponge, and the iron to be so altered during the process as to be incapable of containing its original quantity of heat.

To Rumford and Davy at the end of the 18th and the beginning of the 19th century, is due the credit of the two experiments that to their minds did overthrow, and to all other minds ought to have overthrown, the calorist hypothesis. Rumford remarking on the vast quantity of heat given out during the boring of brass cannon at the arsenal at Munich, and especially being struck with it on comparing it with the small quantity of the cuttings and powder removed from the mass, considered that it was scarcely conceivable that an alteration in the capacity for heat of so small a quantity of the brass, should cause the evolution of so large a quantity of heat. He argued from the fact that the supply of heat producible by mechanical work is apparently unlimited, and from experiments showing that the specific heat of the brass cuttings was precisely the same as that of the massive metal, that heat cannot be a fluid; and he brought forward what was all but a convincing proof that it can be nothing but a form of motion. Among the contributions of Davy to the science was his beautiful and celebrated experiment of rubbing together two pieces of ice, while surrounded by an ice cold atmosphere, till they melted away completely. Now the specific heat of water is nearly double that of ice, and the circumstances absolutely prevented any heat being acquired from the surrounding objects. Thus he showed the very large quantity of heat required for the liquefaction of the ice produced under circumstances where none of the calorist explanations could hold. He concluded that the "immediate cause of the phenomenon of heat is motion, and the laws of its communication are precisely the same as the laws of the communication of motion." This statement was given by Davy in his "Chemical Philosophy" (1812); the date of Rumford's paper in the "Philosophical Transactions" is 1798; but it was not till 30 years after that the conclusions of Rumford and Davy were adopted. We cannot enter here into a complete history of the development of the dynamical theory of heat. We must pass directly to Joule, who between 1840 and 1843 conclusively established the truth of the dynamical hypothesis, by measuring the amount of energy required to produce a definite heating effect, and by showing that the quantity of heat obtained by expending a definite amount of energy in friction is the same whatever is the nature of the body in which the friction takes place. The conclusions arrived at by him are thus given:

(1) The quantity of heat produced by the friction of bodies, whether solid or liquid, is always proportional to the quantity of work expended.

(2) The quantity of heat capable of increasing the temperature of 1 pound of water 1° F. requires for its evolution the expenditure of mechanical energy represented by the fall of 772 pounds through one foot.

Thus work equal to 772 foot-pounds is called the dynamical equivalent of heat, meaning thereby the dynamical equivalent of a pound Fahrenheit unit of heat.

That heat is a form of energy is now considered by all to be beyond question. Every substance, whether solid, liquid, or gaseous is considered to have some kind of molecular structure. What the nature of the molecular structure is, is a question of great difficulty, nay, a question that at

present no one pretends to be able to answer; but whatever is the nature of the molecular structure, it is certain that heat consists of relative motions of the particles. The greater the energy of the motion the higher the temperature of the body, so long as it maintains its original state, solid, liquid, or gaseous; and an alteration in the nature of the motion probably, we may even say certainly, constitutes the change from one of the states of matter to another. The reader may consult the article Gas for some further information as to the most recent speculations on the relations between temperature and pressure in the case of gases. The kinetic theory of gases has not yet been completely extended to the liquid and solid states of matter; but, of the applicability of a corresponding theory, and of the necessity of it, there can be no doubt.

It is perhaps scarcely to be regretted that the discoveries of Rumford and Davy lay unheeded for nearly half a century, for it is impossible to say how their adoption would have affected the efforts of two great investigators in the mathematical theory of heat, Fourier and Carnot. To the former we owe a complete investigation of the theory of conduction and radiation of heat; and not that alone, but likewise a method of mathematical analysis of extraordinary power, the effects of which have been felt in every branch of physical science. To the latter we owe his "Reflexions sur la Puissance Motrice du Feu," in which he endeavors to determine how it is that mechanical effect is produced from heat; and though he assumes in his investigation the materiality of heat, yet his principles and laws, modified so as to correspond with now received notions are at present the basis of thermodynamics. His work is devoted to the consideration of the conversion of heat into work, the converse of the problem of Joule.

From the investigations of Joule, and the discovery of the equivalence of a definite quantity of mechanical energy to a definite quantity of heat, sprang the grand principal of conservation of energy; and perhaps we may say that from an extension of some of Carnot's investigations with respect to heat engines, sprang Kelvin's great principle of dissipation of energy. The first law extends the principle of equivalence to other forms of energy. It asserts that the whole amount of energy in the universe, or in any limited system which does not receive energy from without or part with it to external matter, is invariable. If energy of any form seems to disappear in such a case, it reappears in some other form. Thus, mechanical energy may be converted into heat. Heat again may be converted into the energy of electricity in motion, or into the potential energy of chemical separation. And electrical energy, whether potential or kinetic, and the energy of chemical separation, are also convertible into heat. The second principle states that no known natural process is exactly reversible, and that if we transform mechanical energy into heat, for example, we never can pass back and obtain from the heat produced precisely the amount of mechanical energy with which we commenced. Whatever attempt is made to transform and retransform energy by an imperfect process, and no known process is perfect, part of the energy is necessarily transformed into heat and is dissipated so as to be incapable of further transformation. It therefore follows that as energy is in a constant state of transformation, there is a constant process of degradation of energy going on, a process by which energy constantly approaches the unavailable form of uniformly diffused heat; and this will go on till the whole of the energy of the universe has taken this final form.

Heat, Radiation of, consists in the propagation of heat from a hotter body to a colder one through an intervening medium which is not heated during the process. If we compare the case of heat conducted from particle to particle along an iron bar, one end of which is exposed to a high temperature, with that of heat transmitted to us from the sun, it is evident that the two processes of propagation are very different. It is certain that it is not by the heating of the intervening region between the sun and the earth that heat is transmitted in the latter case. Radiant heat is transmitted by the same medium that transmits light from a luminous body. Radiant heat and light are in fact the same thing, namely, vibration of an elastic medium, only they are perceived by us in different ways. Radiant heat and light obey the same laws of reflection, refraction, interference, and polarization. In fact, being both of them vibrations of the same nature, they both obey all the general laws of wave motion and the particular laws of the particular kind of wave motion that they belong to. They also obey similar laws with respect to transmission through various substances and with respect to absorption. Let us now explain briefly the nature of the vibrations that constitute radiant heat.

Any intensely heated body, a ball of quicklime, for example, that has been heated to whiteness has the power of exciting vibrations in a certain highly elastic medium, commonly called the luminiferous ether. Of this medium we know very little at present, except that it probably pervades all space; that it certainly pervades without apparent alteration in quantity or quality, the best vacuum that we can obtain; and that while it has scarcely any retarding effect on the motions of the plan-

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ets and comets, yet it posseses elasticity of the nature of rigidity, which gives it the power of transmitting the minute vibrations of light, and which is greater in proportion to the density of the medium than that of any known solid. The vibrations of light and heat are such that the direction of the disturbance is perpendicular to the direction of propagation of the wave. Thus the undulations that constitute light and heat resemble rather waves in water, or waves running along a stretched string, than the waves of sound. Now such a heated body as we have considered excites in the medium waves of a great many different wave lengths and consequently different times of vibration, which are propagated outward from the white-hot body in all directions. Of these some are capable of affecting the eye as light, and others are not. Those waves which falling on the eye give the sensation of light have wave lengths between about $\frac{800}{1000000}$ of a millimeter and $\frac{350}{1000000}$ of a millimeter, and though undulations proceed from the white-hot body whose wave lengths are both greater than and less than those just specified, yet they are not perceived by the eye as light. Those that have a wave length greater than $\frac{800}{1000000}$ are, however, perceived by the thermometer. It is only vibrations of this kind that are radiated from a body which has been heated in the fire to less than dull red heat and having no light-giving power, such rays are usually called rays of dark heat. Those that have a wave length less than about $\frac{350}{1000000}$ are not sensible to the eye as light, nor are they sensible to the thermometer as heat, but they have powerful chemical effects. They are called actinic rays and may be examined photographically.

The properties of the rays, as far as luminous and heating effects are concerned, leaving polarization out of the question for the present, depend solely on the wave length and the amplitude of the vibration. It is the wave length that determines the character of the ray. In light it determines the color, and in both heat and light it determines the refraction of the ray. The amplitude of vibration determines the intensity of the ray. Rays of light of low refrangibility, the red rays and the yellow rays, for instance, possess considerable heating power. Falling on a non-translucent substance they are absorbed and the substance becomes warmed. In fact the energy of vibration of the luminiferous ether is converted into energy of motion of the particles of the substance on which the light falls, and the temperature of the substance rises. The same is the case with the invisible or dark heat ray; but it is difficult to obtain any considerable heating effects from rays of less wave lengths than about $\frac{500}{1000000}$ of a millimeter, which corresponds to green light. Radiant heat consists, then, of motion of a certain elastic fluid. This motion is of the same character precisely as the motion that constitutes light; but only observable as heat when it possesses sufficient energy to be able to raise the temperature of any body on which it falls and which absorbs it. Further, the thermometer proves to us the existence of dark heat, that is undulations not perceptible to the eye; and the prism, aided by the thermometer, shows us that dark heat exists in the complete system of vibrations transmitted from the sun and other intensely heated bodies.

We have considered the nature of radiant heat at considerable length on account of the want of clearness as to the relations between heat and light prevalent in almost all popular writing on this subject. It must be distinctly understood that the vibrations that we are here concerned with have certain properties of which for the present purpose those that are important are the wave length and the amplitude of the vibration, that is, the greatest extent of the disturbance. Whether the vibration falling on the eye gives light or not depends solely on the wave length and it is the wave length that defines the color of the light. This may be stated otherwise if we consider that the velocity of propagation in a homogeneous medium is the same for all wave lengths, and that therefore the time of vibration is inversely proportional to the wave length. We may then say that whether the vibrations give the sensation of light or not depends on the frequency of the vibrations, and the color of the light depends on the same thing. The heating effect of the vibrations depends on the energy of the vibrations; and that again depends on the time of vibration and on the amplitude and extent of the disturbance. The intensity of the light, when the vibrations cause the sensation of light, and the heating effect go together. Hence to speak as if light were one thing and heat another is not only misleading but actually false.

Having explained the nature of heat rays let us next briefly consider the laws of radiation. The general effect of radiation is to equalize the temperature of any system of bodies so placed as to be capable of radiating one to the other. Every body of the system according to Prevost's "Theory of Heat Exchanges," is constantly sending forth heat rays in all directions, and receiving the heat radiated from the other bodies. But the hotter bodies emit more than they receive, while the colder bodies receive more than they send forth and the temperature of the system is thus gradually equalized. This simple law is the result of long and difficult inquiry. It is known under the name just given, and the principle ex-

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tended and worked out in detail by the experiments of Balfour Stewart and other investigators, is the most important in the general theory of radiation.

A heated body exposed in a space colder than itself loses heat to the surrounding objects by radiation, and the amount of heat lost in a given time depends, all other things being equal, on the difference between the temperature of the body and the temperature of its surroundings. The simplest case is when a small heated body is suspended in the middle of a chamber, the walls of which are of uniform structure, or rather surface, and of uniform temperature. Under these circumstances, if, when the temperature of the heated body is 20° higher than that of the walls one degree of temperature is lost in one minute, then it would lose 2° in a minute were the excess of its temperature above that of the walls 40°, and only half a degree were the excess of temperature only 10°. The loss in any given interval of time is in fact proportional to the excess of temperature of the heated body above the temperature of the surroundings. It follows from this that the cooling of a body, under such circumstances, goes on according to the well known "compound interest law." Thus if the body loses 5 per cent. of its excess of temperature in the first minute, it loses 5 per cent. of what is left in the next minute, in the third minute 5 per cent. of the second remainder. The law that has just been stated is known as Newton's law of cooling. It may be applied to circumstances much more varied and complicated than those just referred to. In such a case, however, it is necessary to take the effect of the circumstances carefully into account. Serious errors have been introduced even into the calculations of competent mathematicians by applying the law unmodified to cases that it was never intended to include.

On comparing the radiation from various bodies under the same circumstances, it is found that the radiation from some bodies is much greater than from others. Some lose their heat far more rapidly than others. It is necessary in making such a comparison to consider bodies that are, properly speaking, comparable. For example, in comparing the rate of cooling of two balls of different metals both polished, let us suppose, the balls must be of dimensions so small that differences in conductivity which may exist do not interefere with the genuineness of the experiment. Particulars such as these being attended to, it may be stated that the radiation depends on the nature of the surface of the body, and that the power of a body to radiate heat is intimately connected with its power of absorbing heat radiated to it and with its power of reflecting heat. Surfaces that are good radiators are good absorbers, and surfaces that absorb heat readily reflect it badly. Take, as a very familiar case, two kettles of the same dimensions and of the same material, one of them brightly polished, the other covered with soot and having generally a dull surface. First let both be filled with hot water, and let them be hung up in the same room and examined from time to time with the thermometer. It will be found that the dull, sooted kettle loses its heat far more rapidly than the brightly polished kettle does. Again, if the experiment — which, however, would not be very easy in this form — were tried of exposing the two kettles, each with cold water, in a space whose walls are kept heated and are radiating heat, it would be found that the sooted kettle gains heat far quicker than the other. Experiments on this subject were made in great variety by Leslie, who examined emission, absorption, and reflection of a great variety of surfaces, both for dark heat and for the heat of luminous rays. The best absorber of all is a surface covered with a thin coating of lampblack. Such a surface absorbs almost every ray of every kind that falls upon it. Brightly polished metals are the worst absorbers among bodies that are not transparent to radiant heat.

Lastly we must consider very briefly the transmission of radiant heat through various substances — a subject of great importance. Here we meet with great variety, just as we do in case of light. We know but one body almost perfectly transparent to heat — almost perfectly diathermanous, as it is called, the names diathermanous and athermanous being used in radiant heat to correspond to transparent and opaque, which are applied to light. That substance is rock salt. Rock salt transmits nearly the whole of the heat that falls on it, and the heat is transmitted independently of the nature of it, that is independently of whether the heat is of great or of small wave length.

All other bodies have been found to behave toward heat as colored glasses behave toward light. For example, white glass transmits light unaltered; blue glass transmits blue light, that is, light of high refrangibility; red glass transmits red light, that is, light of low refrangibility. With respect to heat, while clear rock salt transmits heat of all wave lengths, common white glass transmits rays of high refrangibility, stopping those of low refrangibility. Hence its use as a fire screen. For the greater part of the heat of a common fire is of the dark kind and nearly all of this is stopped by the glass; but glass does not screen from the heat of the sun, a great part of which consists of heat of high refrangibility. On the other hand, smoked rock salt transmits very little of

the heat of high refrangibility, though it is almost perfectly diathermanous to dark heat rays; and solution of iodine in bisulphide of carbon is perfectly opaque to light and perfectly athermanous to heat of high refrangibility, but yet it transmits dark heat with great freedom. The property of selective absorption is of extreme importance. It is the possession of it to a high degree in gases that gives rise to the dark lines seen in the solar spectrum.

Heat Engine, a thermo-dynamic engine in which motive power is produced by the development of heat. Such are steam and hot-air engines, and others which are effective by the explosion of gas, etc.

Heat Spectrum, in physics, the spectrum of calorific rays. As a beam of light after passing through a prism is dispersed into a spectrum of visible colors, which differ in apparent brightness, so the perceptible warmth is also dispersed into a band, which differs in various regions in the amount of heat and the special qualities of that heat. The heat is greatest of all at the extreme end of, or just beyond the visible red. Modern science only recognizes waves of different lengths and periods, each of which is adapted to produce certain effects.

Heath, or **Heather,** a shrub of the family *Ericaceæ* mostly natives of the Old World, though the common heath of England, *Calluna vulgaris,* is also indigenous to a few localities in New England, Nova Scotia and Newfoundland. The Scotch heather-bell is *Erica cinerea.*

Heath, Francis George, an English botanist; born in Totnes, Devonshire, Jan. 15, 1843. He became a surveyor in the customs department, and supported movements for the extension of open spaces, chiefly in and around London. His works on agricultural subjects include: "The Romance of Peasant Life" (1872); "The English Peasantry" (1874); "The Fern World" (1877); "Sylvan Spring" (1880); "My Garden Wild" (1881). In 1898 he began the publication of a series of patriotic readers.

Heathen, in the Old Testament, a Gentile, one not a Jew; but with the further implication that he worshiped false gods, or that, if he served Jehovah, he did so by forbidden methods, and that, in consequence of his erroneous faith, he, or at least his fellow worshipers, practised moral abominations abhorrent to the true people of God. Heathen is the rendering of the Hebrew word *goim,* peoples, nations, foreigners, gentiles; heathens in the special sense. In the authorized version it is sometimes rendered "nations," sometimes "gentiles," and sometimes "heathens." See Lev. xxv: 44, xxvi: 45, II Sam. xxii: 44, II Kings xvi: 3, xvii: 15, xxi: 2, II Chron. xxviii: 3, xxxiii: 2, xxxvi: 14, Psa. ii: 1, cxxxv: 15, Jer. x: 2.

In the New Testament the Greek equivalent for Hebrew *goim* is *ethnē,* and is applied to those who are not of the Christian or Jewish faiths. The non-Christian portion of mankind, excluding the adherents of Judaism and Mohammedanism, as also Deists and Atheists, are nowadays deemed heathen. New views tend to take root first in cities and towns, then to spread to villages, and finally to affect the open country. The word heathen obtained its modern theological sense when the towns were Christian and the country chiefly of the prior ethnic faith.

Heathfield, George Augustus Elliot, Lord, a British military officer; born in Roxburghshire in 1718. He entered the British army in 1735, was wounded at Dettingen in 1743 and in 1762 took part in the capture of Havana. In 1775 he became commander-in-chief of the forces in Ireland, and soon after governor of Gibraltar. Spain and France having sided with the United States against Great Britain, Gibraltar was beseiged by the two former powers, and successfully defended by Elliot from 1779 to 1783, the siege and defense being among the most memorable in history. He died in 1790.

Heaton, John Henniker, an English journalist; born in Rochester, May 18, 1848. At the age of 16 he emigrated to Australia, became connected with the press, and was prominent in all public and philanthropic works in the Australasian colonies. As M. P. for Canterbury, England, he introduced a proposal for a universal international penny postage system. In 1898 he carried his imperial penny postage bill through Parliament. His chief works are: "The Australian Dictionary of Dates and Men of the Time," a standard work of reference on Australia; "The Manners, Customs, Traditions, and Annihilation of the Aborigines of Australia"; "A Short Account of a Canonization at Rome."

Heave Offering, the rendering of the Hebrew word *terumah* = (1) an oblation, an offering, a gift; (2) a sacrifice consecrated by elevating it; *rum* = to elevate one's self. When Aaron was consecrated high priest, Moses and his coadjutors were enjoined to sanctify or set apart the shoulder of the ram used for the consecration, called the shoulder of the heave offering, which was to be waved and heaved up. It thenceforth became Aaron's and his sons', as an offering by the Israelites from their peace offerings to Jehovah. Similar arrangements were to be carried out in all future time (Exod. xxix: 27, 28), and all heave offerings were to belong to Aaron and his sons, with their legitimate successors (Num. xviii: 8, 19).

They were specially given in connection with peace offerings (Lev. vii: 11–14). Heave offerings were to be given when the first bread of the land was consumed, and in connection with the produce of the threshing floor (Num. xv: 19–21; Deut. xii; 6). Even tithes were looked on as heave offerings (Num. xviii: 24); so was a share of the prisoners, animals, and other prey taken in war (Num. xxxi: 28, 29, 41).

Heaven, in theology, the place or state of the blessed. Heaven among the Greeks and Latins was regarded as the home of the greater gods, not as the abode of the just after death. In Hesiod there is a reference to the Islands of the Blest, where the heroes of the Fourth Age were to pass a second life. Afterward the Elysian Fields, by Pindar placed in the extreme West, though they often were thought to be beneath the earth, were supposed to be the home of the spirits of the just. In most of the ethnic beliefs, heaven, as a state, is a realization of the earthly *summum bonum*. There are three chief sites of the ethnic heaven: (1) Some distant part of this earth: The seats of happiness are represented by some Hindu writers to be vast mountains on the N. of India; (2) below the earth, as many of the lower races still think; and (3) in the extreme West, an opinion with poetic beauty in its favor, since it is in that region the sun descends to his home, the land where, according to the solar myths, there is no more night.

In Jewish history, many passages relate to heaven, or the heaven of heavens, as the special abode of God (I Kings viii: 27), and very high (Job xxii: 12). With regard to man, the references in the Old Testament to a state of existence beyond the present are few; these few, however, assign joy and pleasure to the righteous (Psa. xvi: 10, 11), attended by resplendent glory (Dan. xii: 2, 3).

In Christianity, the heaven of blessedness is spoken of as if its locality was upward from the earth (Luke xxiv: 51; John i: 32; Rev. xi: 12, xxi: 10). God, whom the disciples and Christians generally were taught to address as their Father, is there (Matt. v: 16, 45, 48; vi: 9); Christ came thence at first (I Cor. xv: 47), and when His mission to earth was complete, reascended thither (Luke xxiv: 51). The Holy Spirit was sent down from heaven (I Peter i:12); the throne of God is there (Rev. iv: 2; v:1); nay, in one sense, all heaven is that throne (Matt. v: 34). Innumerable angels are in heaven, surrounding the Divine throne (Rev. v:11); there is a temple also (Rev. xi: 19; xiv: 17; xvi: 17). Multitudes of persons, sealed as the servants of God, out of every nation, shall be there, clothed in white robes and with palms in their hands (Rev. vii: 3, 9). They shall no more hunger or thirst, or feel undue heat or any sorrow (13-17). This felicity will not be reached till after the resurrection, when this corruptible shall put on incorruption, and this mortal immortality, death, the last enemy, being destroyed (I Cor. xv: 26, 54).

Heaven Bridge, a bridge, sometimes called the Bridge of Death, supposed to reach from this world to heaven, spanning the abyss of hell. Along this bridge the souls of the departed must travel: the good to pass over in safety, the wicked to fall into the abyss. It is spoken of under different names in the Zend-Avesta, in the Rabbinical literature, and the Preliminary Discourse to Sale's translation of the Koran. This bridge exists in the mythology of the Javanese, the Karens, the Bornese, the Greenlanders, and the Indians of North and South America. It has a place in the myth of Baldur; it lingers in the English song of "The Brig o' Dread"; and to this day the peasant of the Nièvre tells of a little board put by St. John between the earth and Paradise.

Heaven God, the sky personified and worshiped as the supreme deity. The heaven god of the primitive Aryan was Dyu, the bright sky, afterward Dyaus pitar, the Heaven father, consort of the Earth mother. The *zeus pater* of the Greeks was credited with all celestial phenomena. A fragment from Sophocles — which Plumptre translates:

> "The air is Zeus, Zeus earth, and Zeus the heaven.
> Zeus all that is, and what transcends them all"—

and one line of Ennius, which may be rendered "behold this lofty glowing [sky] which all invoke as Jove," and is quoted by Cicero — show that among the Greeks and Latins the heaven god became later the god of heaven. Tylor (Prim. Cult., ii, 231 *sqq.*) traces a similar development in the religion of the North American Indians, the Zulus, the tribes of Western Africa, the Tartar tribes; and among the Chinese Tien (Heaven) is in personal shape the Shang-ti, or Upper Emperor, the Lord of the Universe.

Heaven Tree, the mythic tree or vine which figures in many primitive beliefs as affording a means of ascent from the regions underground to the surface of the earth, or from the surface of the earth to the sky. Tylor says that variants of this myth have been found in the Malayan and Polynesian districts, in North and South America, in Borneo, the Celebes, and in New Zealand. In this country it survives in the nursery tale, "Jack and the Bean Stalk," which, strangely enough, is little known among cognate peoples.

Heavy Spar, in mineralogy, a native sulphate of baryta; called also barite, from Greek *barus,* heavy. It is found in crystals that are usually tabular, also massive. Its color is white, but sometimes tinged yellow, red, blue, or brown. Some varieties, from the presence of carbonaceous matters, are fetid when rubbed. Sp. gr., 4.3–4.8. Components: Sulphuric acid 34.3, baryta 65.7. Heavy spar occurs commonly with the metallic ores, and is found in many parts of the United States. At Dufton, England, fine crystals are found, one of which weighed 100 pounds. It is largely used in the adulteration of white lead. When very white, the baryta improves the color of the lead and likewise preserves it from the action of vapors of sulphur which speedily blacken it.

Hebbel, Friedrich, a German dramatist; born in Wesselburen, Holstein, March 18, 1813. A poor but precocious peasant lad, his youthful poems brought him patrons, and education in philosophy and history at Heidelberg. In 1839 appeared his first tragedy, "Judith," and his recognition was instantaneous; a volume of short poems in 1842 widened his reputation; an allowance from the Duke of Holstein enabled him to travel. In 1844 the tragedy "Mary Magdalen" appeared at Paris. He married a celebrated actress, settled in Vienna, and produced "Herod and Mariamne"; "Julia"; and other plays. In the Nibelungen trilogy and in "Demetrius" he has produced what many consider his masterpieces. He died in Vienna, Dec. 13, 1863.

Hebdomadary, in the Roman Catholic Church, a member of a chapter or convent, whose work it is to officiate in the choir, rehearse the anthems and prayers, and perform other services which on extraordinary occasions are performed by the superiors.

HEBE.

Hebe (hē′bē), the Greek goddess of youth, daughter of Jupiter and Juno — answering to the Latin goddess Juventas. She was originally the cup-bearer to the gods, but being superseded by Ganymede, she was employed to harness her mother's peacocks and prepare Juno's chariot. She subsequently became the wife of Hercules and the mother of Alexares and Aniatus.

Hebel, Johann Peter (hā′bel), a German poet; born in Basle, Switzerland, May 11, 1760; educated for the ministry, he held various pastorates and rectorships; and devoted his leisure to poetry, his subjects drawn from the dialect and folklore of his parishioners. His "Ancient German Tales," "for friends of rural life and manners," published in 1803, has attained wide celebrity. This and other poetry owed its vogue to exquisite appreciation of nature, pleasing revelations of rustic simplicity, and vivid realism. He died in Schwetzingen, Sept. 22, 1826.

Heber, Reginald, an English poet, and clergyman; born in Malpas, Cheshire, April 21, 1783. In 1800 he was sent to Brasenose College, Oxford. In 1802 he obtained a university prize for a copy of Latin hexameters; and the following year he greatly distinguished himself by another prize poem — "Palestine"— in English. He was elected to a fellowship in All Soul's College, and soon after traveled in Germany, Russia, and the Crimea, and made observations from which many curious extracts were published in the travels of Dr. E. D. Clarke. Having returned home, he published an English poem entitled "Europe: Lines on the Present War" (1809). About the same time he was presented to the family living of Hodnet, and for several years devoted himself, with great assiduity to his duties as a parochial priest.

In 1815 he was appointed Bampton lecturer, and two years after received a stall in St. Asaph's Cathedral. In 1822 appeared his life of Jeremy Taylor, with a review of his writings. In the same year he was elected preacher of Lincoln's Inn. On the death of Bishop Middleton he was offered the see of Calcutta, which he accepted, and June 16, 1823, embarked for the East Indies. On Ascension Day, 1824, Bishop Heber held his first visitation in the cathedral of Calcutta; and he subsequently made progresses through various parts of his very extensive diocese, consecrating churches and taking the appropriate steps for extending the knowledge of Christianity among the Hindus. Having taken a journey in the discharge of his episcopal duty he arrived at Trichinopoli, April 1, 1826, and on the next day while bathing he was seized with an apoplectic fit which terminated his existence. He published a volume of hymns in 1812, and after his death was published a "Narrative of a Journey through the Upper Provinces of India," from his MSS. His widow also published his biography (2 vols., London, 1830).

Hébert, Jacques René (ā-bār′), a French Revolutionist; born in Alençon, in 1755. At an early age he went to Paris as a servant. Soon after the commencement

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of the Revolution he became one of the most prominent members of the extreme Jacobins, and when this group established "Le Père Duchesne" newspaper, Hébert was made editor of it. In consequence of the events of Aug. 10 he became a member of the revolutionary council, and played a conspicuous part in the massacres of September. He was one of the commission appointed to examine Marie Antoinette. He and his associates, called Hébertists, were mainly instrumental in converting the Church of Notre Dame into a temple of Reason. But he went too fast for Robespierre, who had him guillotined March 24, 1794.

Hebrews. The appellation of Hebrew (from the Hebrew word *Ibri*, from the other side, that is, of the Euphrates), so far as we can learn from history, was first given to Abraham by the people of Canaan, among whom he dwelt (Gen. xiv: 13). It seems to have been applied to him on account of his emigration (about 2,000 B. C.) from Mesopotamia, beyond the Euphrates, into the land of Canaan (Palestine). Some, however, consider it as a patronymic derived from Heber, great-grandson of Shem, from whom Abraham was descended. Whatever meaning was attached to the term Hebrews, before the time of Jacob (Israel), it appears afterward to have been limited to his posterity, and to have been synonymous with Israelites. This latter term was used by the Jews of themselves among themselves, the former was the name by which they were known to foreigners. The word Hebrew is used either where foreigners are introduced as speaking (Gen. xxxix: 14, 17; xli: 12; Ex. i: 16; I Sam. iv: 6, 9), or where they are opposed to foreign nations (Gen. xliii: 32; I Sam. xiii: 3, 7). So in Greek and Roman writers we find the name Hebrews or Jews, but never Israelites.

Hebrew Language and Literature.— The Hebrew language (Hebrew, *ibrith*, or *lashon ibrith*, also *leshon hakkodesh*, sacred tongue in post-Biblical Jewish works, *jehudith*, Jewish, in the Biblical history of the period following the Babylonish captivity) forms a branch of that extensive family of languages called Semitic, from the real or supposed descent of those who speak these languages from Shem, the son of Noah. The Semitic languages may be divided into three branches — the Arabic, to which the Ethiopic is closely allied, the Aramaic, consisting of two dialects, the Babylonic or East Aramaic (sometimes called Chaldee), and the Syriac or West Aramaic, and the Hebrew. Once identical with the Phœnician, Hebrew was adopted by Abraham and his family in Palestine. The peculiar religious and moral notions of the Hebrews could not but impress upon it by degrees a distinct character, and thus Hebrew became a distinct dialect. In the antiquity of its extant literary remnants it far surpasses all other Semitic idioms, and in richness and development is only inferior to the Arabic. It is deficient in grammatical technicalities, especially in moods and tenses of the verb, and consequently, also, somewhat in precision; but in simplicity, brevity, and power of poetic expression it is hardly excelled by any tongue. The alphabet is composed of 22 letters which, according to Buxtorf and his school, are all consonants, the vowels being expressed by marks above or below the letters. The system of vowel points was introduced so late as the 6th or 7th century of our era by the rabbis of the school of Tiberias when the Masora, a collection of critical, exegetical, and grammatical remarks on the sacred texts, was first committed to writing. There are no capital letters. The accents and marks of punctuation amount to about 40. The writing is from right to left. There are three kinds of Hebrew alphabet now in use — the square or Assyrian (properly called the Babylonian), which is generally supposed to have been introduced by Ezra, the most common in print; the rabbinical, or mediæval, used chiefly in commentaries and notes; and the cursive, in writing. (See ALPHABET.)

The extant classical Hebrew writings embrace a period of more than 1,000 years from the era of Moses to the date of the composition of the books of Chronicles, which stand last in the Hebrew Bible. We naturally expect that the language of the earliest books should differ considerably from that of the later, and that we would even be able to trace a gradual change in the form of the language, becoming more and more decided as century followed century, and new influences were brought to bear upon it. This expectation is not, however, realized. There is indeed to be observed a very decided difference in style and language between the earliest and the very latest Hebrew writings, but this difference was the result, not of a very gradual process of change extending over centuries, but of a very sudden and rapid revolution. Hence the extant Hebrew writings, when classified with respect to language, have usually been arranged in two great divisions — those of a date earlier than the Babylonish captivity, and those of a subsequent date. In passing from the book of Genesis to the books of Samuel we do not recognize any very striking difference in the language. Doubtless there is a difference; but not such a difference as we might expect to find in writings separated from one another in date by so considerable a period; not so much difference as we actually find when we take up an English author of the 17th century, or even later, and compare his language with the English of the present day. The explanation of this remarkable phenomenon is not to be found in the rejection of the traditional belief as to the age and authorship of the Pentateuch.

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Even some critics who bring down the Pentateuch as a whole to a comparatively late era admit that a portion at least of its contents is to be assigned to the Mosaic age (Ewald, Lehrbuch, sect. ii: c.); and thus, unless it can be shown that this most ancient portion bears in its language and style the stamp of high antiquity, and is distinguished in a very marked manner from the other portions of the Pentateuch (which has not been shown), the phenomenon still remains unexplained. But indeed the phenomenon is by no means unexplained. It does not stand alone. The Chinese language displays the same tenacity and aversion to change still more decidedly, and it is well known that the written Arabic of our own day does not differ greatly from that of the first centuries after Mohammed.

It is probable that the language was as it were, stereotyped by becoming the language of books held in highest esteem, diligently studied by the learned, frequently committed to memory and adopted as a model by succeeding writers. In further explanation of this phenomenon appeal has also been made to the permanence of Eastern customs and to the simple structure of the language, which rendered it less liable to change than other more largely developed tongues. Some of the peculiarities of the early writing may be concealed by the uniformity of the system of punctuation adopted and applied to the Scriptures by the Hebrew grammarians. The writings which belong to the second age — that subsequent to the Babylonish captivity — differ very considerably from those which belong to the first; the influence of the so-called Chaldee language acquired by the Jews in the land of their captivity having greatly corrupted the national tongue. The historical books belonging to this age are the books of Chronicles, Ezra, Nehemiah, and Esther. In the prophets who prophesied during and after the captivity, with the exception of Daniel, the Chaldee impress is by no means so strong as we might anticipate, they having evidently formed their style on that of the older prophets. It is important, however, to observe that the presence of what appears to be a Chaldeism is not always the indication of a later age. Chaldee words and forms occasionally appear even in the most ancient Hebrew compositions, especially the poetical, the poet delighting in archaic and rare words, and substituting these for the more commonplace. But between the Chaldaic archaisms and the Chaldeisms of the later Scriptures there is this marked distinction, that the former are only occasional and lie scattered on the surface, the latter are frequent and give a peculiar color and character to the whole language. At what time the Chaldee became the dominant element in the national language it is impossible to determine. All political influences favored its ascendency; and with these concurred the influence of that large portion of the nation still resident in the East, and maintaining constant intercourse with a Chaldee-speaking people. To these influences we cannot wonder that the Hebrew, notwithstanding the sacred associations connected with it, gradually succumbed. On the coins of the Maccabees indeed the ancient language still appears; but we cannot conclude from this circumstance that it maintained its position as a living language down to the Maccabean period. The fragments of the popular language which we find in the New Testament are all Aramaic; and ever since, the Hebrew has been preserved and cultivated as the language of the learned and of books, and not of common life.

Since the return from the captivity, the Jewish, or as it is often called, Rabbinical literature, has been extensively cultivated. Under the guidance of Ezra the Scriptures were collected, authenticated, and enlarged into a canon. The Pentateuch was publicly read, taught in schools, explained, hermeneutically expounded and translated into Aramaic or Chaldee. The legal or religious traditions explanatory or complementary to the law of Moses were traced back through the prophets and elders to that law-giver, and systematically established as the oral law. These labors resulted in the "Midrash," divided into the "Halacha" and the "Haggada"; the former considered the improvement of the law with a view to practical results; the latter the essence of the religious and historical. Later on we reach the Maccabean era, to which belong the whole of the Apocrypha, various Greek versions of the Bible, and several collections of prayers, poems, and proverbs. To the succeeding epoch belong the earlier Christian writers, Hillel the elder, Shammai, his rival, Gamaliel, and others; while the age following the destruction of Jerusalem (A. D. 70) witnessed the completion of the New Testament and the historical works of Josephus, written, however, in the Greek language. On being driven from their capital by the Romans, numerous schools were established by the Jews in which their language and literature were taught. Of these schools the most celebrated were those of Babylon and Tiberias. The "Mishna," which contains the traditions of the Jews and interpretations of the Scriptures, is supposed to have been compiled in the latter part of the 2d or in the earlier part of the 3d century, by Jehudah Hanassi. From this period the "Mishna" was considered one of the principal works of Hebrew literature, and the rabbis of Tiberias and Babylon wrote numerous commentaries on it. These commentaries were at length collected into two separate works and entitled the Jerusalem and the Babylonian "Talmuds." The "Je-

rusalem Talmud" seems to have been completed about the end of the 4th century, and the "Babylonian Talmud" about a century later, under the care of Rabbi Ashe.

The most brilliant epoch of modern Jewish literature is incontestably that of the domination of the Moors in Spain. Treated by these conquerors with a mildness which contrasts strongly with the cruelty with which the Christian kings of that country used them, the Jews applied themselves enthusiastically to the culture of science and literature. The proscribed nation soon found itself at the head of the civilized world, without excepting even the Arabs, whose intellectual culture is a subject of admiration among all historians of that time. No science remained unstudied by the Israelites; astronomy, geography, philology, medicine, history, poetry, music, the Spanish rabbis knew well and taught well. The Jewish school of Toledo was the most renowned of all the schools in the Peninsula. This is the era of the great Moses ben Maimon (Maimonides), the illustrious disciple of Averroes; of the poet and philologist Aben-Ezra; of David Kimchi, of Isaac Pen-Sid, etc. The age of persecution of the Jews in Spain had set in several years before it reached Portugal, and the celebrated Academy of Lisbon flourished up to the end of the 15th century. But at last the unfortunate people were driven from that country, and took up their scattered residences in France, Germany, Italy, and, in fact, in most of the countries of Europe, where they could find the least toleration. At Leghorn they founded those printing establishments from which issue at the present day a great number of the works published in Hebrew. The 17th century was more fatal to Judaism than even the centuries of persecution, for there sprang up within itself a more terrible plague than persecution — incredulity. It was the age of Spinoza, the pantheist, whom the orthodox Jews even of our days regard with horror. But even before his day the Hebrew language had been falling rapidly into disuse among the learned, who, with the exception of a few enthusiastic rabbis, employed in their works the language of the country in which they had settled. In Germany many of the writers of the 18th and 19th centuries are Jews, or of Jewish extraction, and are among the brightest names in her literature. We need only mention those of Moses Mendelssohn, the celebrated philosopher; Neander, Heinrich Heine, Berthold Auerbach, Herz, Börne, etc.

Hebrews, Epistle to the, one of the most important epistles of the New Testament. Clement of Rome referred to it about A. D. 96, as did Justin Martyr in the 2nd century, followed in due time by many other Christian fathers. When the epistle was written, the temple worship seems still to have continued (v. 1–4, viii: 3, ix: 25), which would place its date earlier than A. D. 70, the year when Jerusalem was destroyed. Its author was not one of those who had heard Jesus, but belonged to the generation immediately succeeding (ii: 3). Who he was, is a question which has excited difference of opinion both in ancient and modern times. The Greek fathers generally attributed the epistle to St. Paul; the Latin Churches in Europe and Northern Africa were long of a different opinion, but by the commencement of the 4th century the Eastern view largely prevailed, in the West as well as in the East, and by the commencement of the 5th century it was everywhere dominant. Jerome and Augustine had much influence in giving it currency, which it retained to the Reformation. Erasmus, Cardinal Cajetan, Luther, Calvin, Beza, and others revived the old doubts. The Council of Trent gave a decision in favor of St. Paul, but in Protestant countries the question is still held to be a debatable one. Passages such as x: 34 and xiii: 23 might well have been written by St. Paul during his imprisonment in Rome, and there are a multitude of expressions in Hebrews like those of the epistles admitted to be St. Paul's. But, taken as a whole, the Greek composition is more finished and more rhetorical than that of the apostle. If Paul was not the author, who was? The early Church said Clement of Rome or St. Luke or Silas, called also Silvanus; Luther suggested Apollos, a much more probable opinion, which has since been ably defended in Germany by Semler, Bleek, De Wette, Tholuck, etc.

The "Hebrews" to whom the epistle was addressed were the Jewish converts to Christianity, specially those resident in Palestine, to whom Aramæan was vernacular, though they knew Greek. Some fathers thought that the Greek epistle was translated from Aramæan, but it has all the characteristics of an original writing. The Old Testament quotations are from the Septuagint, even where it differs from the Hebrew as if the author had not been familiar with the latter tongue. His treatment of types, symbols, etc., is suggestive of Philo and the Alexandrian writers, but this is not conclusive as to the epistle having been written in Egypt.

Its canonical authority was accepted in the early Church by many who denied its Pauline authorship. Eusebius places it among his Homologoumena, and there has never been any impeachment of its integrity.

Internal evidence shows that the Palestinian Christians to whom it was addressed were in great danger of being seduced or persecuted again into the Judaism, which

they had left (x: 32–39). The epistle was designed to keep them steadfast. It opens with arguments for the divinity of Christ and His consequent superiority to the angels. Hence Christianity bestowed through Him is superior to Judaism communicated by means of angels (i., ii: 1–3); He, a son, is superior to Moses, a servant (iii: 5, 6; His everlasting priesthood is superior to that of Aaron (vii.); His sacrifice was an effective one, of which those of Judaism were only types and shadows (ix.); Christianity was founded on the New Covenant, which was to abide, while the Old one decayed and was ready to vanish away (viii: 13). Let the converts hold fast to their Christian belief (ii: 1–3, x: 32–39), avoid apostasy (vi: 4–9), and imitate the ancient worthies, whose animating principle was faith (xi.). seeking for a "continuing city" in another world rather than in this (xiii: 14). See JEWS.

Hebrides (heb′ri-dēz), a large group of islands, 490 in number, situated off the W. coast of Scotland, of which 120 are inhabited. They comprise, in all, an area of about 3,000 square miles. Among the larger and more notable of these are Skye, Eigg, Mull, Iona, Staffa, Ulva, Lismore, Islay, and Rum, the largest being Skye, of the inner Hebrides, that lie nearer the coast; and Lewis, Harris, Northern and Southern Uist, Barra and Benbecula, of the outer Hebrides, lying farther W., and separated by the strait and channel of Minch and Little Minch from the inner group, the largest being Lewis and Harris, really forming but one island, but belonging to two counties. These islands are for the most part rocky and infertile, but well adapted to grazing purposes, the chief industry being the pasturing and rearing of live stock. The islands have been developed and improved by the building of good roads, and the establishment of frequent communication with Glasgow by steamship. The moors and fens abound in winged game, hare, etc., and are visited by sportsmen in great numbers, being largely and profitably rented for sporting purposes. The islands are a resort for summer tourists on account of their picturesque scenery, which combines ocean and hill views admirably. There are also picturesque lakes, bogs, glens, and streams in great number. The fishing industry is considerable. Pop. (1901) est. over 100,000.

Hebrides, New, a group of islands in the South Pacific, discovered by Quiros, in 1506. Captain Cook, who surveyed most of them in 1773, gave them their name, as being the most W. of the islands of the Pacific. They extend over 375 miles. Area, 4,200 square miles. The soil in the valleys is fertile, but the islands are mostly mountainous, and some have active volcanoes. Since 1880 the group has formed a British dependency. Pop. (1901) est. 135,000.

Hebron (hē′bron), one of the oldest cities in Palestine, belonging to the tribe of Judah, 21 miles from Jerusalem. It was anciently called Kirjatharba, and at a later period was the seven years' residence of King David before he conquered Jerusalem. The modern town, El Khalîl ("the friend" — of God, Abraham), is a poor place, inhabited by some 10,000 people. It lies low down in a narrow and picturesque valley — the Valley of Eshcol, famous now, as of old, for its thick clustering grapes, its olives, and other fruits. The church erected by the Empress Helena, the mother of Constantine, on the spot where Abraham is said to have been buried, has been converted into a mosque called *El-Haram* ("sanctuary"), built to enclose the cave which is the traditional burial-place of Abraham, Isaac, and Jacob and their wives.

Hebrus. See MARITZA.

Hecatæus (hek-a-tē′us) **of Miletus,** an early Greek historian and geographer, usually styled "the logographer," flourished most probably about 500 B. C. He seems to have visited Greece, Thrace, the countries bordering on the Euxine, and many of the provinces of the Persian empire, with parts of Italy, Spain, and Africa, and the results of his observations were given in two great works — his "Tour of the World," and his "Histories" or "Genealogies"; the latter, however, is little more than a prose version of the poetical legends of the Greeks. Only fragments now remain. At the revolt of the Ionians against Persia he dissuaded its ring-leader, Aristagoras, from an attempt so far above the means of his countrymen; and when that counsel was despised, urged the formation of a fleet, but in vain. Hecatæus afterward went as ambassador to the Persian satrap Artaphernes, and induced him to treat the Ionians with leniency.

Hecate (hek′a-tē), a mysterious goddess who was apparently unknown to the Greeks of Homeric times and may be of Oriental origin. She makes her first appearance as a goddess having power over earth, heaven, and sea. This triple power may perhaps give the clue to the fact that in art she is occasionally represented as a triple figure. It also explains the fact that ultimately she came to be identified with many other goddesses, such as Artemis, Eileithyia, Selene, Iris, Persephone, Aphrodite, Gaia, Hestia, Isis, Physis, and the Bona Dea. Her power was above all displayed in the matter of ghosts. She also herself appeared as a bogey, with torch and sword, and snakes for hair; or she might appear as a dog, a mare, a lioness, or a

cow. As her appearance was the sign for dogs to bark, so she was supposed to be accompanied by a train of Stygian dogs. The origin of this figure is uncertain; she is claimed as a moon goddess, and her name is interpreted in accordance with this view as indicating the action of light at a distance. Her intimate connection with the spirits of the dead would point to her having originally been a goddess of the nether world, for the earth is regarded as the abode of the spirits of the departed. This would explain her connection with the mysteries, and the propitiatory offerings made to her in atonement for sin. Dogs were offered to her at cross-ways (which are favorite haunts for ghosts), she herself is termed fond of dogs, and sometimes appeared leading Cerberus.

HECATE, FROM A COIN.

Hecatomb (hek'a-töm), in classical and Homeric ages, a sumptuous or magnificent sacrifice — originally consisting of the sacrifice of 100 beasts of the same kind, at 100 altars, by 100 priests or sacrificers. Pythagoras is said to have sacrificed a hecatomb of 100 oxen to the Muses, in joy and gratitude for his having discovered the demonstration of the 47th proposition of the first book of Euclid. Though a true hecatomb consisted of 100 oxen, yet, in the time of Homer, the word had lost its real etymological meaning; it merely meant a great public sacrifice. Thus, in the "Iliad," an allusion is made to a hecatomb of 12 oxen; to another of oxen and rams; and to another of 50. In modern language, the word refers to any public sacrifice of a large number of victims.

Hecker, Friedrich Karl Franz, a German-American soldier; born in Eichtersheim, Baden, Sept. 28, 1811. After studying law in Heidelberg, he abandoned his profession for political life. On the outbreak of the revolution in Germany in 1848 he endeavored to convert the preliminary convention into a permanent republican assembly. But, frustrated in this attempt, he put himself at the head of a band of revolutionists, and invaded Baden from the S.; he was, however, defeated at Kandern and fled to Switzerland. In the following year he removed to the United States, and became a farmer near Belleville, Ill. On the outbreak of the Civil War he raised a regiment of Germans, and afterward for a time commanded a brigade. He died at St. Louis, March 24, 1881.

Hecker, Isaac Thomas, an American Roman Catholic clergyman; born in New York, Dec. 18, 1819. In early life he was a member of the Brook Farm community. He founded the order of the Paulists (1858), became their superior; and established the "Catholic World" (1865), editing it till he died. A life of Father Hecker, written by a Frenchman, was condemned in Rome and led to a papal letter condemning "Americanism." He wrote "Questions of the Soul" 1855); "The Church and the Age" (1888); etc. He died in New York city, Dec. 22, 1888.

Hecker, Justus Friedrich Karl, a German medical author; born Jan. 5, 1795; became Professor of Medicine at Berlin. Among his writings are a history of medicine (1829), books on the Black Death, etc., and the great work, the "Epidemics of the Middle Ages." He died in 1850.

Hecla, or **Hekla,** a volcano of Iceland, about 20 miles from its S. W. coast, about 5,000 feet in height, and having several craters. It is composed chiefly of basalt and lava, and is always covered with snow. Many eruptions are on record. One of the most tremendous occurred in 1783, after which the volcano remained quiescent till September, 1845, when it again became active, and continued with little intermission till November, 1846, to discharge ashes, masses of pumice stone, and a torrent of lava.

Hectic Fever, a malady attended by frequency and weakness of pulse, alternations of cold with heat and flushing, followed by perspiration; the strength daily decreases, and the body wastes away. Hectic fever is often produced when an abscess goes on to suppuration; it is also an attendant of phthisis, dysentery, etc.

Hector, the son of Priam and Hecuba, the bravest of the Trojans, whose forces he commanded. His wife was Andromache. His exploits are celebrated in the "Iliad." Having slain Patroclus, the friend of Achilles, the latter sought revenge, and Hector was slain by him. The body of Hector was dragged at the chariot wheels of the conqueror; but afterward it was delivered to Priam for a ransom, who gave it a solemn burial. Hector is the most attractive warrior in Homer's "Iliad," in which one of the finest episodes is his parting from Andromache before his last combat.

Hecuba, a daughter of Dymas, King of Thrace; according to some of Cisseus, or of the river Sangarius and Metope. She was the second wife of Priam, King of Troy, to whom she bore Hector and Paris. While pregnant with the latter she dreamed that she brought a torch into the world, which consumed all Troy. The explanation of this dream, given by the soothsayers, was that her son should occasion the ruin of the kingdom. He was consequently exposed, but miraculously rescued from death. Hecuba

afterward became the mother of Creusa, Laodice, Polixena, Cassandra, Deiphobus, Polydorus, Troilus. After the conquest of Troy the unhappy princess was made a slave by the Greeks and, according to one form of the legend, in despair leaped into the Hellespont. Others say she was put to death by the Greeks. The old tragedians represent her on the stage as a tender mother, a noble princess, and a virtuous wife, subjected to the most cruel destiny.

Hedberg, Frans Theodor, a Swedish dramatic poet; born in Stockholm, March 2, 1828. He began life in a store, then turned to wig-making, and at last drifted to the stage. "The Wedding at Ulfasa," published in 1865, a historical piece; and "When You Have No Money," a comedy brought out in 1854 and afterward rewritten, are typical of his talent. He produced many plays, besides writing a history of the Swedish stage.

Hedge, a fence formed of living trees or shrubs. Hedges are often composed of one or more of the following: Hawthorn, crab, blackthorn, holly, privet, beech, hornbeam, maple, barberry, furze, broom, alder, poplar, willow, yew, box, arborvitæ, sweet-briar, etc. Though superior to dry stone walls, they take up much room, and exhaust the soil to some extent. Hedges are probably more common in England than in any other country. It has been calculated that judicious trimming of hedges would increase the cultivated land in England and Wales by 490,000 acres, an effect similar to the addition of a new county of moderate size. They were not very common in England till the close of the 17th century.

Hedding, Elijah, an American clergyman; born in Pine Plains, N. Y., June 7, 1780. In youth he went to Vermont where he became an itinerant preacher of the Methodist Episcopal Church. After about 25 years of itinerant labors, he was ordained bishop in 1824, and made his home in Lynn, Mass. He died in Poughkeepsie, N. Y., April 9, 1852.

Hedge, Frederick Henry, an American scholar; born in Cambridge, Mass., Dec. 12, 1805. He edited the "Christian Examiner" (1857–1860), and was Professor of German at Harvard University (1872–1881). Deeply read in philosophy, ecclesiastical history, and German literature, he was a finished writer and a polished orator. Among his writings are: "Reason in Religion" (1865); "The Primeval World of Hebrew Tradition" (1870); "Martin Luther and Other Essays" (1888); etc. His "Prose Writers of Germany" (1848) is a standard work. He translated and wrote numerous hymns for the Unitarian Church, and introduced German scholarship and literature into this country. He died in Cambridge, Mass., Aug. 21, 1890.

Hedgehog, the *Erinaceus*, a quadruped distinguished by having the body covered with spines instead of hair. The skin of the back is provided with a great orbicular muscle which enables the animal to roll itself up in the form of a ball. The tail is very short. There are several species known — some authorities enumerate 14 — and these animals (which belong to the order *Insectivora*) inhabit Europe and great part of Asia and Africa. The best known is the common hedgehog (*E. Europæus*), a native of most of the temperate parts of Europe and Asia. This species has a long nose, the nostrils bordered on each side by a loose flap; the hind feet have five toes; the ears are short, rounded, naked, and dusky; the upper part of the face, sides, and rump covered with strong, coarse hair, of a yellowish ash color, the back with sharp, strong spines of a whitish tint with a bar of black through their middle. They are usually about 10 inches long, the tail about one. Their usual residence is in small thickets, and they feed on fallen fruits, roots, and insects; they are also fond of flesh, either raw or roasted. Pallas remarks that they can eat hundreds of cantharides without suffering from them, while a single one of these acrid insects will cause the most horrible torment in dogs or cats. It has been asserted that they mount fruit trees and come down with apples, pears, etc., stuck on their bristles. This is false. That accurate observer, Gilbert White, observes that the manner in which they eat the roots of the plantain is very curious. With their upper mandible, which is much longer than the lower, they bore under the plant, and gnaw off the root upward, leaving the tuft of leaves untouched. The hedgehog defends himself from the attacks of other animals by rolling himself up, and thus exposing no part of his body that is not furnished with a defense of spines. It may be rendered domestic to a certain degree, and has been employed in Europe to destroy cockroaches which it pursues with avidity. In the winter the hedgehog wraps itself in a warm nest, composed of moss, dried hay and leaves, and remains torpid till spring. The female produces four or five young at a birth, which soon become covered with prickles. These animals are sometimes used as food. The skin was formerly used for napping cloth. The long-eared hedgehog (*E. auritus*) is smaller than the common and is distinguished by the great size of its ears and shortness of tail; in its manners it is said to be similar to that species. This species inhabits from the N. part of the Caspian Sea to Egypt. The species found in bone caves (*E. fossilis*, Schmerl.) is scarcely to be distinguished from the common living species. The Miocene species (*E. priscus*, Pomel) found in Auvergne is larger than the living.

Hedge Mustard, a genus of plants of the natural order *Cruciferæ,* annual or rarely perennial herbs, with very various foliage, small yellow or white flowers, and a long roundish or six-angled pod (silique). It is an annual plant, plentiful in temperate climates in waste places and by waysides, sometimes two feet high, branched, with runcinate or deeply-lobed leaves, stem and leaves hairy.

Hedge Priest, in Great Britain and Ireland, a poor, illiterate cleric. Specifically one admitted to orders directly from a hedge-school without having studied theology. Before the establishment of Maynooth the practice of admitting men to ordination before their departure for the continental colleges was very common, in order that they might gain the stipend for saying mass. In some of the religious orders men are ordained immediately after profession for a similar reason. The nickname "hedge priest" was originally bestowed on these ecclesiastics by the continental clergy. It is sometimes applied to a suspended priest.

Hedge School, a school in the country parts of Ireland conducted in the open air, under the shelter of a hedge, while a rude schoolhouse, to which the name was transferred, was being erected for the accommodation of the children. Now universally used in a depreciatory sense.

Hedge Warbler, or **Hedge Sparrow** (*Accentor modularis*), a bird of the family *Sylviadæ,* common in the British Islands and occurring in all temperate climates. It feeds on insects, worms, and seeds; and its nest, built of green moss, roots, and wool, and lined with hair, is often finished early in March. The eggs, four or five in number, are bluish green. The cuckoo often deposits her egg in the hedge warbler's nest. The plumage is generally of a reddish brown, streaked with dark brown. The song of the male is short and plaintive. The length of the bird is about 5½ inches.

Hedonism (hē′don-izm), the tenets of the Cyrenaic school of philosophy founded by Aristippus, a disciple of Socrates. Aristotle calls him a Sophist, possibly because he demanded payment for his instruction. He taught that pleasure was the end of life, and that it was the duty of a wise man to enjoy pleasure without being controlled by it. This control was to be acquired by knowledge and culture. Horace, in one line, tersely sums up the philosophy of Aristippus: "I propose to subdue things to myself and not myself to things." The most eminent of the Cyrenaic school were Arete, the daughter of the founder, her son, surnamed from her teaching Metrodidaktos, Theodorus the Atheist, and his scholars, Bio and Euhemerus. Anniceris the Younger sought to ennoble the Hedonic principle by reckoning civil and social duties among the things which afford pleasure, yet he asserted that our efforts for the benefit of others should have an egoistic motive. Later the Cyrenaic doctrine gave way to Epicureanism.

Heem, Jan Davidsz van (hēm), a Dutch painter, born in Utrecht in 1606. In 1635 he enrolled himself in the Antwerp guild of painters. Heem's pictures represent for the most part fruits and flowers, insects and creeping things, and drinking cups, bottles, etc. Masterpieces by his hand are hung in the galleries of Amsterdam, Vienna, Berlin, Munich, St. Petersburg, and other places. He died in 1683 or 1684.

Hegel (hā′gl), **Georg Wilhelm Friedrich,** a German metaphysician; born in Stuttgart in 1770. He studied at the theological institute of Tübingen from 1788–1793, and was next a private tutor at Berne (1793–1796), and subsequently at Frankfort-on-the-Main (1797–1800). Having removed to Jena, and contracted an intimacy with Schelling, he devoted himself to metaphysical study. After the battle of Jena, Hegel was employed on a newspaper at Bamberg till 1808.

GEORG W. F. HEGEL.

He was professor successively at Jena, Heidelberg, and Berlin. He was at first the disciple of Schelling, with whom he was associated in the conduct of a philosophical journal in 1802–1803. But his opinions gradually took a different turn. He rejected Schelling's intellectual intuition as an unwarrantable assumption, though he continued to maintain its leading idea — the unity of the subjective or ideal, and the objective or real; and in this idea endeavored to establish that absolute cognition and absolute truth which alone, according to this school, can satisfy the demands of the philosophical spirit. Hegel seems not to have perfected his system; and as he had no power of exposition, or of lucid expression of his thoughts, it is impossible to give a clear view of his philosophy. Indeed, it would appear that he himself had the same notion; for he is said to have remarked, that, "of all his numerous disciples, only one had ever understood him, and even he

had understood him falsely." Be this as it may, his system is at present the center of nearly all philosophical interest in Germany, chiefly from the widely discrepant deductions, political and religious, which his friends and enemies draw from it; some maintaining it to be favorable to the present order of things in Church and State, others founding on it conclusions at variance with all ordinary notions of religion or morality. His most important works are his "Phenomenology of the Mind"; "Logic"; and "Encyclopædia of Philosophical Sciences." He died in Berlin in 1831.

Hegira, Hejra, or **Hijra** (hej'i-rä), an Arab word which means "going away," the term commonly used to indicate Mohammed's flight from Mecca, Sept. 13, 622 A. D. In 639 or 640 the Caliph Omar instituted a new Moslem calendar, to begin with the first day of the first month of the year in which the flight took place. The Mohammedan year, as a lunar year, is shorter than ours by 10 days, 21 hours, and 14 2-5 seconds. A rough and ready method for finding the year in our calendar corresponding to a given year in the Mohammedan is to subtract from the latter $\frac{1}{33}$ of itself and add 622 to the remainder. To find the precise year and day, multiply the year of the Hegira by 970,224, strike off from the product six decimal figures, and add 621.5774; this will give the year of the Christian era; and the day of the year is got by multiplying the decimal figures by 365.

Hegner, Ulrich (heg'ner), a Swiss story-writer and humorist; born in Winterthur, Feb. 7, 1759. His reputation was made by "The Whey Cure" (Die Molkenkur), and "Susan's Nuptials." "Sally's Revolution Days" is an effective picture of conditions in Switzerland at the end of the 18th century. He died in Winterthur, Jan. 3, 1840.

Heiberg, Hermann (hī'berg), a German novelist: born in Schleswig, Nov. 17, 1840. He retired in 1870 from the publishing business left him by his father, to devote himself to letters and journalism. His numerous stories, novels, and essays have been widely read, particularly "Talks with the Duchess of Seeland." Other successful books include "Shoulder to Shoulder"; "Blind Love"; and "The Golden Serpent," ingenious and powerful novels.

Heiberg, Johann Ludvig, a Danish poet and critic, son of Peter Andreas; born in Copenhagen, Dec. 14, 1791. His first literary training was received from his father whose widow became Baroness Gyllembourg-Ehrensvärd. His early attempts in literature were as an exponent of the philosophical system of Hegel. He then turned to play-writing: "King Solomon and the Hatter" and "April Fools" were extremely successful, the latter being still popular with Danish audiences. He was known as a sound critic and a graceful essayist, and was long the undisputed law-giver of the Danish Parnassus. He died in Bonderup, Seeland, Aug. 25, 1860.

Heiberg, Peter Andreas, a Danish dramatic poet, satirist, and political writer; born in Vordingborg, Nov. 16, 1758. His early political writings resulted in his banishment. He went to Paris and entered the service of Talleyrand, and obtained lucrative posts under the first French empire. His comedies, especially "Heckingborn," have been much admired, and successfully produced on the English, French, Danish, and German stage. He had a rare genius for social satire. His "Life of a Dollar Bill" is a prose fancy. He died in Paris, April 30, 1841.

Heidelberg (hī'dl-berg), a town of Baden; on the left bank of the Neckar, here crossed by two bridges; in one of the loveliest districts of Germany. It is on a narrow strip between the river and the castle-rock and Geisberg, spurs of the Königstuhl (1,850 feet); and chiefly consists of one main street and less important cross and parallel streets. The principal buildings are: The church of St. Peter; the church of the Holy Ghost; the castle, anciently the residence of the Electors Palatine; HEIDELBERG UNIVERSITY (*q. v.*); the town house, etc. The castle, begun in the end of the 13th century, and exhibiting elaborate examples of early and late Renaissance architecture, is the most remarkable edifice in Heidelberg. It is now an ivy-clad ruin, but is carefully preserved from further decay. The principal industry is brewing. One of the greatest curiosities of the place is the Heidelberg tun, kept in a cellar under the castle. It is 36 feet in length, 26 in diameter, and capable of holding 800 hogsheads. Heidelberg is rich in public walks and fine views, that from the Königstuhl being of surpassing beauty. It was long the capital of the Palatinate, but was superseded by Mannheim in 1720. In 1622 Tilly captured and sacked the city. A similar fate overtook it in 1689 and 1693 at the hands of the French. Pop. (1905) 49,439.

Heidelberg Catechism, a work first published at Heidelberg in 1563, drawn out by Zechariah Ursinus for the use of the Reformed Church, and published in the Palatinate. It was received beyond this limit, was approved by the Synod of Dort, and was the model on which the Westminster Assembly framed the Shorter Catechism.

Heidelberg University, a coeducational institution in Tiffin, O.; founded in 1850 under the auspices of the Reformed Church in the United States; reported at the close

of 1900: Professors and instructors, 29; students, 369; volumes in the library, 15,000; productive funds, $275,000; value of grounds and buildings, $125,000; income, $20,000; number of graduates, 506; president, Rev. J. A. Peters, D. D.

Heidelberg University, a renowned institution in Heidelberg, Germany. It was founded by the Elector Rupert I. in 1386, and continued to flourish till the period of the Thirty Years' War, when it began to decline. In 1802, however, when the town with the surrounding territory was assigned to the Grand-duke of Baden, a new era commenced for the university, and it rapidly became famous. It comprises faculties of theology, law, medicine, and philosophy, and in 1902 reported 157 professors and instructors, 1,640 students, and 500,000 volumes and 4,700 MSS. in its library. Many of the most famous German scholars have been professors here — Reuchlin, Œcolampadius, Spanheim, Puffendorf, Voss, Schlösser, Creuzer, Gervinus, Paulus, Kuno Fischer, Helmholtz, Bunsen, Blüntschli, etc. The quincentenary of the university was celebrated with elaborate ceremonial in 1886.

Heights, Measurement of. See HYPSOMETRY.

Heilbronn, a town of Würtemberg, situated on the right bank of the Neckar. The streets of the old mediæval town are narrow, and the houses have quaintly ornamented gable-ends and tapering pinnacles. The church of St. Kilian, partly Gothic and partly Renaissance; the old town hall; the Diebsthurm ("Thief's Tower"), in which Götz von Berlichingen was confined; and the house of the Teutonic Knights, now a barrack, are the principal buildings. The chief industries include the manufacture of silver plate, paper, sugar, salt, chicory, and chemicals, and there are iron and other metal foundries and machine shops. Fruit and wine are largely grown. Commercially the importance of Heilbronn depends on its trade in groceries, corn, and wood, and on its fairs for cattle, leather, wool, and fruit. In the vicinity gypsum and sandstone are quarried. Heilbronn is first mentioned in 741; in 1360 it became an imperial town; it suffered during the Peasants' War and the Thirty Years' War, and in 1802 it fell into the hands of Würtemberg. Pop. (1905) 40,026.

Heilprin, Angelo (hīl-), an American naturalist; born in Sátoralja-Ujhely, Hungary, March 31, 1853; son of Michael Heilprin; came to the United States in 1856; was educated in Europe; Professor of Invertebrate Palæontology and Geology, 1880–1900; and executive curator, 1883–1892, in Academy of Natural Sciences, Philadelphia, Pa.; Professor of Geology in Wagner Free Institute, 1885–1890; president for five years of the Geographical Society, Philadelphia; leader of the Peary Relief Expedition in 1892. He wrote: "Tertiary Geology and Palæontology of the United States" (1884); "Geographical and Geological Distribution of Animals" (1887); "Animal Life of Our Seashore" (1888); "The Bermuda Islands" (1889); "Principles of Geology" (1890); "The Arctic Problem" (1893); "Alaska and the Klondike" (1900); etc. Immediately after the terrible eruption of Mont Pelée, Island of Martinique, on May 8, 1902, he started for the scene of the disaster, as representative of the National Geographical Society, and on May 31, amid a shower of mud and ashes, ascended to the summit of the volcano. See MONT PELÉE. He died July 17, 1907.

Heilprin, Michael, an American scholar; born in Piotrkow, Poland, in 1823; joined the Hungarians in 1848 and belonged to the literary bureau of the interior in 1849; came to the United States in 1856, and contributed to various literary journals. He was one of the chief compilers of "Appleton's American Cyclopædia," and published "The Historical Poetry of the Ancient Hebrews." His interest in Russian-Jewish emigrants led to the establishment of several agricultural colonies in the United States. He died in Summit, N. J., May 10, 1888.

Heilsbronn, a Bavarian village of middle Franconia, 16 miles S. W. of Nuremberg; was the seat of a celebrated Cistercian monastery, which owed its origin to Bishop Otho of Bamberg in 1132. Nearly all the burgraves of Nuremberg were buried here till the end of the 15th century, when it became the burial place of the Franconian branch of the Hohenzollerns. Though the monastery was suppressed in 1555, the church still retains a large number of highly interesting sepulchral monuments and other examples of mediæval German art.

Heimburg, Wilhelmine (hīm'börg), pseudonym of BERTHA BEHRENS, a German story-writer; born in Thale, Sept. 7, 1850. Her principal works are: "From the Life of My Old Friend" (1879); "Lumpenmüller's Lisbeth" (1879); "The Wendhusen Cloister" (1880); "Her Only Brother" (2d ed. 1883); "Crises of the Heart" (1888); "Under the Linden" (1888), short stories; "Forest Flowers" (5th ed. 1891), a collection of short stories; "An Insignificant Woman" (1891); "Miss Useless" (1893).

Heimdall, in Celtic mythology, son of the nine virgins, all sisters. He is called the god with the golden tooth, or with golden teeth. He keeps the keys of

heaven, sleeps less than a bird, sees even in his sleep, can hear the grass grow, and even the wool on a lamb's back. Heimdall, at the end of the world, will wake the gods with his trumpet, when the sons of Muspell will go against them, with Loke, the wolf of Feuris, and the great serpent Jormungandar.

Heine (hī'n), **Heinrich,** a German poet and author; born of Jewish parents in Düsseldorf, Dec. 13, 1799. He studied law at

HEINRICH HEINE.

Bonn, Berlin, and Göttingen; took his degree at the last mentioned place, and in 1825 embraced Christianity. He afterward lived at Hamburg, Berlin, and Munich, but in 1830 he settled in Paris, supported himself by his literary labors, and dwelt there till his death. From 1837 to the overthrow of Louis Philippe in 1848 he enjoyed a pension of $960 from the French government. Of the numerous literary works of Heine may be mentioned in particular: "Poems"; "Pictures of Travel"; "Book of Songs"; "Germany, a Winter Tale"; "Shakespeare's Maidens and Wives"; "Last Poems and Thoughts"; etc. As a poet Heine is remarkable for the simplicity and pathos of many of his lyric pieces. His powers of wit and raillery were also great, but he often transgressed the bounds of propriety and decorum. Scepticism and over-sensuousness are prominent characteristics. During the latter years of his life he suffered great agony from a spinal complaint which confined him almost constantly to bed. He died in Paris, Feb. 17, 1856.

Heinrich von Veldecke (hīn'rich fon vel'de-kē), a German poet of the 12th century. He celebrated in verse the jousts and tournaments of his day. His love songs are among the most exquisite that have survived from that period. His epic of "Eneit" is a classic. It is not modeled after Vergil's "Æneid," but after the "Roman d'Énéas," attributed to Benoit de St. Maure. He practically originated the "minne" or love-song as it has come down to us. His principal work was completed about 1190.

Heinrich, Wolf. See BAUDISSIN, COUNT VON.

Heintzelman, Samuel Peter (hīnts'elman), an American military officer; born in Manheim, Pa., Sept. 30, 1805; was graduated at the United States Military Academy in 1826. and served during the Mexican War. In 1861 he commanded a division at Bull Run, July 21, where he was wounded. Afterward promoted Brigadier-General of volunteers, Heintzelman, during the organization of the army in the winter of 1861–1862, held command of a division. On the moving of the Army of the Potomac, in March, 1862, the 3d Army Corps was placed under his command. His corps formed the right wing of Pope's army at the second battle of Bull Run, Aug. 30, 1862. During the Maryland campaign he commanded the defenses at Washington, and was afterward appointed to the command of the Department of Washington, and of the 22d Army Corps, which he held during the battles of Chancellorsville and Gettysburg, in May and July, 1863. He retired in 1869, with the rank of Major-General U. S. A. He died in Washington, D. C., May 1, 1880.

Heir, one who is born or begotten in lawful wedlock, and on whom the law casts the estate, in lands, tenements, or hereditaments immediately on the death of his ancestor. Heir-apparent, he who (by law or custom) must succeed, by descent, to the hereditaments, if he survive the present holder. Heir-presumptive, he who stands nearest in succession in the present circumstances, but whose rights may be defeated by the contingency of some nearer heir being born. The rights of heirs in most of the United States are determined by the principles of the common law unless specially modified by statute. It is a matter of judicial decision that the rights of heirs in the United States are statutory only. Hence they cannot plead, for instance, that an inheritance tax is unconstitutional.

Hejaz, or **Hijaz** (hē-jaz'), a division of Arabia, extending along the N. half of the E. coast of the Red Sea, comprehending a lowland (Tehâma) and a tract of highlands, E. of a range of mountains attaining a height of perhaps 8,000 feet. Mecca, Medina, Jiddah, and Yambo are the chief towns, the two first being annually resorted to by vast numbers of pilgrims. Hejaz forms a part of the Turkish dominions.

Hejra. See HEGIRA.

Hel, in Northern mythology, the goddess of the dead, the sister of the wolf Fenrir,

and daughter of the evil-hearted Loki, by the giantess Angurboda. The All-father hurled her down into Niflheim, and gave her authority over the lower world, where she received all who died of sickness and old age. She was of fierce aspect and had a half black, half flesh-colored skin. To her were assigned the characteristics of insatiable greed and pitilessness. After the introduction and diffusion of Christianity the ideas personified in Hel gradually merged among all the races of Scandinavian and German descent, in the local conception of a hell, or dark abode of the dead.

Helamys (hel'ä-mus), the jumping-hare, an animal which constitutes a genus of mammalia of the order *Rodentia,* allied to the *jerboas.* The head is large, the tail long, the fore-legs are very short in comparison with the hinder. They have four molars, each composed of two laminæ; their lower incisors are truncated; the fore-feet have five toes, furnished with long pointed nails; the hind-feet have four toes, which are separated as far as the bones of the metatarsus, and furnished with large claws, almost resembling hoofs. The species *H. caffer* is pale fulvous, with a long tufted tail, black at the tip. It is as large as a rabbit, and, like it, inhabits deep burrows.

Helbeh, the seed of a plant of the leguminous genus *Trigonella* (fenu-greek), with a somewhat bitter taste, whose flour, mixed with dhurra, is used as food by the laborers of Egypt.

Helder, The, a seaport in the Dutch province of North Holland, 51 miles from Amsterdam. It is one of the strongest fortresses in Holland, having been first fortified by Napoleon in 1811, and has several naval establishments, including an arsenal and a college, and an excellent harbor. Pop. (1905) 26,774.

Helderberg Formation. In North America, a division of the Silurian strata is called (after the Helderberg Range, in the E. of New York State) the Lower Helderberg formation. It appears to be on the horizon of the English Ludlow beds. The Upper Helderberg formation of North America is a member of the Lower Devonian strata.

Helen, in classic fable, the daughter of Jupiter and Leda, of Jupiter and Nemesis, or of the King Tyndareus and Leda, his wife, according to the various statements of the poets, was the most beautiful woman of her time, and married Menelaus, King of Sparta. Her guilty elopement with Paris, one of the sons of Priam, King of Troy, who had been sent to Lacedæmon as ambassador, led to the Trojan War, and the destruction, after 10 years' siege, of Troy. On the death of Paris she married his brother Deiphobus, and when the city was at last sacked, returned to Sparta with her husband Menelaus. Being banished from Sparta on the death of Menelaus, she retired to the island of Rhodes, where, having excited the envy of Polyxo, the queen of the isle, she was tied to a tree and strangled.

PARIS AND HELEN.

Helena, a city and county-seat of Phillips co., Ark.; on the Mississippi river, and on the Arkansas Midland and St. Louis, the Iron Mountain and Southern, and the Yazoo and Mississippi railroads, 90 miles S. W. of Memphis, Tenn. It has steamship communications with all important river ports, and is a shipping point for lumber, cotton, and cottonseed oil. Its manufactures include cotton oil, boxes, cotton goods, machinery, canned goods, and finished lumber. It has electric lights, public schools, public library, the Jefferson High School, Sacred Heart Academy, daily and weekly newspapers, a National bank, and an assessed property valuation of $2,000,000. Pop. (1900) 5,550; (1910) 8,772.

Helena, a city, capital of Montana, and county-seat of Lewis and Clarke co.,

near Prickly Pear creek, and on the Great Northern, the Union Pacific, and the Northern Pacific railroads. It is the commercial center of Montana, Northern Idaho, and Eastern Washington, and has abundant water power from the Missouri river. It has numerous smelting and reduction works, blast furnaces, foundries, machine shops, granite and sandstone works, and does considerable business in mining, farming, and stock-raising. It is the seat of Montana Wesleyan University, St. Vincent's Academy, Orphan's Home, St. Peter's and St. John's Hospitals, and Fort Harrison. The city has electric lights, and electric street railroads connecting with surrounding towns, daily and weekly newspapers, public library, 2 National banks with $450,000 capital, and an assessed property valuation of $10,000,000. Pop. (1890) 13,843; (1900) 10,770; (1910) 12,515.

Helena, the name of several female saints of the Roman Catholic Church, the most celebrated of whom is the Empress Helena, wife of Constantius Chlorus, and mother of Constantine the Great. Whether born in Bithynia, Britain, or at Treves, she became a Christian during the youth of Constantine, but it was not till after the defeat of Maxentius that she formally received baptism. The few remaining years of her life she gave to works of benevolence. In 326, according to almost contemporary tradition, she visited Jerusalem, and there, with Bishop Macarius, discovered the Holy Sepulcher and the cross of Our Lord. Along with it were the crosses of the two thieves, but which was the true cross was shown by its touch restoring a sick lady to health. St. Helena died, it is said, a nun, at the age of 80. Her festival falls on Aug. 18. Two other women of the same name are honored as saints. The first, whose cult is confined to the Russian Church, was the wife of the Grand-Duke Igor, and at her baptism in Constantinople (955) changed her original name, Olga, into Helena; the other was a native of West Gothland, and lived in the 12th century.

Helena, the heroine of Shakespeare's play of "All's Well that Ends Well."

Helena, St., an island in the South Atlantic, belonging to Great Britain; about 850 miles S. E. of the Island of Ascension, 1,150 miles W. from the W. coast of South Africa, and 2,000 miles from the E. coast of Brazil; greatest length, 10½ miles; greatest breadth, 7 miles; area, about 47 square miles. Its position in the ocean thoroughfare from Europe to the East has made it a place of call for vessels, while it has acquired special celebrity as the place of Napoleon's banishment, and where he resided from 1816 till his death in 1821. In 1900 it was selected as a place of imprisonment for captured Boer commanders. It has precipitous and almost inaccessible coasts, particularly on the N., where almost perpendicular cliffs rise from 600 to 1,200 feet. The only town on the island is Jamestown, which has a fine natural harbor, and affords excellent anchorage in 12 fathoms. The island, which is of volcanic formation, derives its name from having been discovered by Juan de Nova Castilla on St. Helena's day. It was afterward possessed by the Dutch, and finally was ceded to the English about 1651. Properly speaking, there are neither manufactures nor trade. About one-fifth of the entire surface is available for cultivation, while the uplands feed large numbers of goats. Pop. (1901) 4,543.

Helena, The, a twin-screw, steel, light draft gunboat of the United States navy; 1,392 tons displacement; length, 250 feet 9 inches; breadth, 40 feet 1 3-8 inches; mean draft, 9 feet; horse power, 1,600; armament, main battery, eight 4-inch rapid-fire guns; secondary battery, four 6-pounder and four 1-pounder rapid-fire guns and two Gatlings; speed, 13 knots; crew, 10 officers and 160 men; cost, $280,000.

Helen and Judith, or the **Hungarian Sisters,** a remarkable double monster female; born in Hungary in 1701. They were exhibited over Europe for about seven years, and lived to the age of 22 years. They were united by the nates and part of the loins.

Helenium, a genus of plants, order *Asteraceæ.* The American sneeze-wort, *H. autumnale,* is a very little plant, in damp places, with a stem two to three feet high, branching; leaves tapering to each end; flowers large, numerous, terminal, with drooping rays, each ending in three obtuse teeth, and longer than the larger, globose disk.

Helenus, a Trojan soothsayer, son of Priam and Hecuba, twin-brother of Cassandra, and husband of Andromache after Hector's death. He foretold the destiny of Æneas.

Heliac, or **Heliacal,** in astronomy, a term meaning closely connected with the sun, rising just before the sun, a term used when a star rises just before the sun. As the sun moves in its orbit, a particular star which had for some time risen after the sun or with him, remaining however invisible, owing to his beams, will at length rise a sufficient length of time before him to be seen. When it does so, this is called its heliacal rising, or it is said to rise heliacally. As in bygone ages the precession of the equinoxes has made various stars in succession rise heliacally, a means of which Sir Isaac Newton made use, is

afforded of computing ancient dates, in cases in which observers have accurately recorded which star in any year rose heliacally.

Heliand (hēl'é-and), the name of an Old Saxon poem dating from the 9th century. Its subject is the life and work of Christ, constructed as a harmony of the four gospels. The poem is written in alliterative verse, in the spirit of the old Low German popular poetry. Besides being the most important relic of the Old Saxon dialect, it is not without intrinsic literary merit.

Helicidæ (hel-is'ē-dē), a large family of terrestrial air-breathing (pulmonate) gasteropods, of which snails are familiar examples.

Helicin, (hel'is-in), in chemistry, $C_{13}H_{16}O_7$. A glucoside formed by the action of very dilute nitric acid on salicin. Helicin crystallizes in white slender needles, which melt at 175°. An aqueous solution of helicin is converted by sodium amalgam into salicin. Boiled with dilute acids or alkalies, it is converted into glucose $C_6H_{12}O_6$, and salicylic aldehyde $C_6H_4 \cdot OH \cdot CO \cdot H$.

Helicograph, an instrument for describing helices. A small wheel rotates on the screw shaft and revolves around the fixed point, moving toward or from the said center according to the direction of its revolution; a pencil describing a helix. The distances between the intersections of an ordinate with the spiral are equal to the pitch of the screw.

Helicoid Parabola, a curve arising from the supposition that the common or Apollonian parabola is bent or twisted till the axis comes into the periphery of a circle, the ordinates still retaining their places and perpendicular positions with respect to the circle, all these lines remaining in the same plane.

Helicon (hel'ik-on), a mountain range (5,736 feet) in the S. W. of Bœotia, in ancient Greece, celebrated as the favorite seat of the Muses. At the foot of the range stood the village of Ascra, the residence of Hesiod, and the seat of the earliest school of poetry in Greece. On the slopes were the famous fountains of Aganippe and Hippocrene, whose waters were reputed to give poetic inspiration.

Helictis (hel-ik'tis), a genus of carnivorous quadrupeds, allied to the skunks, of which there are at least two species, one (*H. moschata*) found in China, the other (*H. orientalis*) in Nepâl.

Heligoland, or **Helgoland** (hel'ig-ō-land), a small island in the North Sea, formerly belonging to Great Britain. It is about 1 mile long from N. to S., and 1-3 of a mile from E. to W.; 1-5 of a square mile in superficial area, and about 2 2-3 miles in circumference. The island consists of two parts, the Oberland, a flat-topped rock affording a little soil for pasture and the growth of potatoes, etc., and the Unterland, a small stretch of shore at its foot. Most of the houses stand on the Oberland. The Unterland gives partial shelter to the shipping. There is a royal Prussian biological station for the study of the fauna and flora of the North Sea. The bathing facilities, which attract so many visitors, are found in a dune or sand bank separated from the main island by a channel about a mile wide. This Sandy Island, as it is called, is slowly being reduced in size by the inroads of the sea. There is a lighthouse on the main island. The inhabitants are chiefly employed in fishing, and speak a Frisian dialect. Heligoland has an important strategic position, is well fortified, and has cable communication with Cuxhaven and Wilhelmshaven. Christianity was first preached here by St. Willibrod in the 7th century and the island from that time received the name of "Holy Land." Taken from the Danes in 1807, it was ceded formally to Great Britain in 1814, but was transferred to Germany in 1890. Pop. (1895) 2,225.

Heliocentric System, in astronomy, the system which regards the sun as the center of our solar system. This theory was first propounded by Aristarchus of Samos, and afterward established by Copernicus. As put forth by him, it needed only Newton's hypothesis of gravitation to complete the system of modern astronomy.

Heliogabalus. See ELAGABALUS.

Heliograph, an instrument constructed by De la Rue for obtaining photographs of the sun. Also an apparatus invented by H. C. Mance for telegraphing by means of the sun's rays. It is composed of a circular mirror, varying in diameter for field or fixed operations. This mirror revolves on a horizontal axis, and is adjusted to the required angle of incidence with the sun by a telescopic rod, and the rays can be directed to any point with the utmost precision. The Morse system of dashes and dots is adopted, and the signals can be read in ordinary weather, without the aid of field-glasses, at a distance of 50 miles.

Heliogravure. See PHOTOGRAVURE.

Heliometer (hē-lē-om'e-ter), an instrument for measuring the apparent magnitude of the sun. The object glass of a telescope is made in halves, set in separate brass frames which slide laterally on each other, the motion being produced and measured by a screw. Each half makes its own image. These may be brought near, or made to separate by the movement of the screw.

The heliometer is a form of micrometer. Also an instrument for ascertaining the solar time in all latitudes, and for ascertaining the latitude when the apparatus is set at noon according to the date. Also for ascertaining the date and length of day, sunrise and sunset, other conditions being established. Also, the differences of time between two places, the position of the earth's axis in relation to the level at the point of observation, etc.

Heliopolis (hēl-ē-op′ō-lis), the On, Rameses, or Beth-shemesh of the Hebrew Scriptures; now called Matarich; situated a little N. of Memphis; and one of the most ancient and extensive cities of Egypt under the Pharaohs. It had a magnificent temple dedicated to Re; and communicated with the Nile by lakes and canals. During the flourishing ages of the Egyptian monarchy the priests taught within the precincts of its temples, and both Eudoxus and Plato visited its famous schools. Here Joseph and Mary are said to have rested with the infant Christ. Near the village stands the Pillar of On, supposed to be the oldest Egyptian obelisk, 67½ feet high, and 6 feet broad at base. The Turks were defeated here by the French in 1800.

Helios (hēl′ē-os), the Greek name of the sun (the Roman Sol), who was worshiped as a god. According to Homer he was a son of the Titan Hyperion and Theia, and a brother of Selene or Eos. He is described by the same poet as giving light both to gods and men. He rises in the E., from the marshy borders of Oceanus, into whose dark abysses he also sinks at evening. The later poets, however, gave him a splendid palace in the E., somewhere below Colchis, and describe him as being conveyed, after the termination of the burning labors of the day, in a winged boat of gold, along the N. coasts of the sea back to Colchis. After the time of Æschylus, he began to be identified with Apollo or Phœbus, but the identification was never complete. His worship was widely spread. He had temples in Corinth, Argos, Trœzene, Elis, and many other cities, but his principal seat was Rhodes, where four horses were annually sacrificed to him. The island of Trinacria (Sicily) was also sacred to Helios, and here his daughters, Phœtusa and Lampetia, kept his flocks of sheep and oxen. It was customary to offer up white lambs or boars on his altars. The animals sacred to him were horses, wolves, cocks, and eagles.

HELIOS.

Helioscope, an instrument for viewing the sun. Stained glass is a simple helioscope. If red it is unsuitable, for that color transmits the rays of heat in sufficient intensity to injure the eye. Green, violet, and dull brown (smoke) are the colors most frequently employed for this purpose. Also a form of reflecting telescope for viewing the sun. It has the object mirror in the form of a double concave lens, with the anterior surface worked into a paraboloid of the proper focal length.

Heliostat, a mirror provided with a clockwork motion, so adjusted as to make it follow the course of the sun, which, therefore, till the day departs, continues to be reflected from its face. Also an instrument invented by Gauss, in 1821, by means of which the rays of the sun can be flashed to great distances. It consists of an adjustable mirror or reflector, worked in connection with a combination of telescopes, and is now used in all trigonometrical surveys. By its aid triangles, with sides over 100 miles in length, can be measured. Drummond's heliostat consists of an equatorial, revolving on its polar axis, so that the sun, when once accurately in the focus of the telescope, continues steadily fixed there.

Heliotrope, a genus of plants of the natural order *Borragineæ;* of the section, sometimes made a distinct order, *Ehretiaceæ,* the fruit separating only when ripe into four carpels. Many of the species have fragrant flowers. The Peruvian heliotrope, a shrub with oblong-lanceolate wrinkled leaves and small lilac-blue flowers, is in almost universal cultivation for its fragrance, which resembles that of vanilla or cherry pie. Many seminal varieties of this species are cultivated in gardens. They delight in rich light soil, and are propagated by cuttings of the young growing shoots in a moist warm atmosphere. The European or common heliotrope, a native of the S. and W. of Europe, is an annual with small white, or rarely pale red, flowers. Large quantities of the flowers are used by perfumers for making scents. Classical fable accounts for the name heliotrope (Gr. *hēlios,* "the sun," and *trepō,* "I turn") by representing Clytia as turned into this flower through gazing at Apollo.

Heliotrope, or **Bloodstone,** a variety of chalcedony or of jasper, of a green color with red spots. The finest heliotropes consist of chalcedony, and are translucent, at least at the edges; the jasper bloodstones are opaque. Heliotrope is found in many parts of the world, as in Scotland, but the finest specimens of this mineral are brought from the S. parts of Asia. It was well known to the ancients, who obtained it chiefly from Ethiopia and Cyprus. It is much used for boxes, seals, etc.; and those

specimens are most valued which possess most translucency, and in which the red spots are bright and well distributed. It was much used in the early ages of the Christian Church for the engraving of sacred subjects, the figures being so managed that the red spots should represent drops of blood. The name heliotrope (Gr. *hēlios*, "the sun"; *tropē*, "a turning") seems to have been given to this mineral because when immersed in water in the face of the sun it was said to make the image of that luminary in it appear of a blood-red color. The heliotrope, thus described by Pliny, must have shown very large spots or veins of red.

Heliotype, in photography, a method of printing from a gelatine surface hardened with alum, in the same way as from a lithographic stone. It is based upon the fact that gelatine, impregnated with an alkaline bi-chromate, when exposed to light, loses its power of absorbing water. A warm solution of gelatine containing a sufficiency of bi-chromate of potash, is poured upon a waxed glass-plate, leveled, and allowed to dry. These operations must be performed in a room illuminated by a non-actinic light only. The film is then stripped from the glass, exposed to daylight under a reversed photographic negative, and then fastened to a metal plate. After washing away the superfluous chemicals, it is rolled with ordinary lithographic ink, which adheres to the gelatine more or less, according to the amount of change produced by the light, and the consequent absorption of the water by the film. It is then ready for printing in an ordinary lithographic press.

Heliozoa, or "sun animalcules," a class of protozoa of the rhizopod type (provided with protruding processes of living matter). These processes are unlike those of the amœbæ in being slender and radiant, unlike those of foraminifera in being stable and rarely interlaced. The unit mass or cell of which the heliozoon consists is globular and stable, with one nucleus or with many, and usually with vacuoles both contractile and non-contractile. There is generally a "skeleton," gelatinous or siliceous, and in the latter case either continuous or composed of loose spicules. Multiplication is effected by division of the cell into two, or by budding, or by that internal fission known as spore formation. In some cases the spores or young heliozoa are flagellate, and thus very unlike the comparatively slow and passive adults. In a few instances heliozoa have been seen united in colonies. The majority live in fresh water, but some are marine. Common examples are *Actinosphærium*, *Actinophrys*, *Raphidiophrys*, and *Clathrulina*.

Helium, in chemistry, an element first discovered in the sun by means of the spectroscope, and so named because it was supposed to be peculiar to that body. It has since, however, been chemically discovered on the earth along with argon. Helium is found in rare minerals, in the Bath springs, in particular springs of the Black Forest and elsewhere. In May, 1898, Dewar, of the Royal Institution, London, England, succeeded by means of the extreme low temperature of boiling hydrogen in reducing helium gas to a liquid. It has the same boiling point as hydrogen.

Helix, a curve generated by winding a line around in a coil of gradually increasing radius, and maintaining the same plane, or by winding the line on a cone on which it ascends in winding. The flat watch-spring, and the fakes of rope in a tier are instances of the flat helix.

In anatomy, a prominent and incurved margin surrounding the thinner and larger portion of the pinna in the ear. In architecture, the small volute under the abacus of a Corinthian column. Of these there are in every perfect capital 16: two at each angle, and two meeting under the middle of each face of the abacus. In geometry, a curve the tangents to which make, with the horizontal plane, a constant angle. The edge of the path of a screw is a helix, as is also the path described by any point of the surface of the thread when moved in the nut. In zoölogy, the typical genus of the molluscous family *Helicidæ*. About 1,600 recent species are known, and 200 fossil, the latter from the Eocene onward. Recent species are found in all countries of the world. The type is *Helix pomatia*, the Roman snail. There are many sub genera of helix.

Hell, a place of punishment, found, with more or less distinctness, in nearly all ethnic forms of religions, the precise nature of the punishment varying widely. Three definite stages in the concept of hell may be traced: (1) a vague notion of a future life, to be spent in misery, with little or no idea of moral retribution; (2) it ranks as a place of torment for those who have offended the gods, but is conceived as limited in duration; and (3) it becomes an important factor in the moral government of the universe, a place where evil deeds done in this life are rigorously punished. Tylor says that the idea of a fiery abyss is so seldom recognized among the lower races that the few cases in which it does occur lie open to a suspicion of not being purely native.

Judaism and Christianity.—(1) In the Old Testament used chiefly for Hades, as in Psalm xviii: 5, cxvi: 3, cxxxix: 8, Prov. v: 5, Isa. xiv: 9; Hab. ii: 5. More rarely in the New Testament it is used in the

same sense, as in Acts ii: 31 with reference to Psalm xvi: 10, and apparently in Rev. i: 18, vi: 8, xx: 13, 14, though the language is mostly figurative. In the Apostles' Creed the article "He descended into hell" means into Hades. This sense of the word is now obsolete, except in old formulas or other archaic writings. (2) The place of woe. This is the common New Testament sense of the word, and is the rendering of Greek *Geenna* (Gehenna). Of those cast into it Jesus says, "Where their worm dieth not, and their fire is not quenched" (Mark. ix: 44, 46–48), the language being adapted from Isa. lxvi: 24. This fire is said to be everlasting fire, prepared for the devil and his angels (Matt. xxv: 41).

Hellas, the original home of the Hellenes, according to the received opinion, was first a town, and afterward under the name of Phthiotis, a well-known district of Thessaly. The ancients, also, sometimes applied this name to the whole of Thessaly. With the spread of the Hellenic people S., the term embraced a gradually increasing territory, till it came to denote the whole of Middle Greece, or Greece Proper (modern Livadia). At a still later period, the Peloponnesus itself was included under the designation; and, finally, Hellas came to be used, in the broadest sense, as comprehending the whole of Greece, with its islands and colonies. The Hellenes, or Greeks, as distinguished from the more ancient Pelasgians, received this name in the belief that they were descended from a certain Hellen. This mythical personage, a son of Deucalion and Pyrrha, or, according to others, of Zeus and Dorippe, and the father of Æolus, Dorus, and Xuthus, was said to have been King of Phthia, and to have ruled over all the country between the rivers Peneius and Asopus.

Helle, the daughter of Athamas, who, flying from her stepmother Ino, was drowned in the Pontic Sea, and gave it the name of Hellespont.

Hellebore (hel'ä-bōr), in pharmacy, the dried rhizome of *Veratrum viride*, growing in swampy districts of the United States. It has a peculiar acrid taste. It is used to control the vascular system in cases of rheumatic gout. It causes depression and slowness of the pulse.

The black hellebore of the ancients was *Helleborus officinalis*, the modern one, *H. niger*. It is reputed to be a drastic purgative. Stinking hellebore is *H. fœtidus;* American white or swamp hellebore is *Veratrum viride;* false hellebore, the genus *Veratrum;* white hellebore, *V. album;* and winter hellebore, *Eranthus hycmalis*. White hellebore is used by gardeners to destroy the gooseberry caterpillar and other insects.

Hellen, in Greek mythology, son of Deucalion and Pyrrha, and founder by his three sons Dorus, Æolus, and Xuthus of the four great branches of the Greek people or Hellenes.

Hellenes (hel'ēns), the native name of the ancient Greeks.

Hellenist, a follower of the Greeks in language, manners, etc.; a Grecian Jew. Also a Grecian; one versed in the Greek language. Also, in the plural, the name given to those Jews who, from their foreign birth or travel, used the Greek (Hellenic) language, and who are distinguished under this appellation in the Acts of the Apostles. There were great numbers of Jews scattered throughout the Roman empire at this period, more especially in the Asiatic and East African provinces, where the Greek was the current language. From their long sojourn in foreign countries, they were distinguished from the Hebraists, or native Jews, by the greater liberality of their views.

Hellespont. See DARDANELLES.

Hell Gate, a formerly dangerous pass in the East river, at New York city. Rocks here used to form an obstruction much dreaded by mariners, but by extensive submarine mining operations and the use of the most powerful explosives the passage has been cleared. See NEWTON, JOHN.

Helmbold, Ludwig (helm'bōld), a German hymn-writer; born in Mühlhausen, Thuringia, Jan. 21, 1532. He wrote sacred songs in Latin and German, the best in the latter tongue. Those beginning "Lord Jesus Christ, Thou prince of peace" and "I will not give God up" are most widely known. He died in Mühlhausen, April 12, 1598.

Helmers, Jan Frederik (hel'mers), a Dutch poet and dramatist; born in Amsterdam, March 4, 1767. His best work was inspired by the reverses of his country growing out of the Napoleonic wars. His finest composition, "The Dutch Nation," is a poetical apotheosis of Holland. He died in Amsterdam, Feb. 26, 1813.

Helmet, a piece of defensive armor for the head; a defensive covering for the head. It was originally made of leather, and afterward strengthened by the addition of bronze and other metals, till finally it was constructed entirely of metal, lined with felt or wadding. In the Middle Ages helmets were frequently inlaid with gold, and provided with bars and movable flaps to cover the face in battle, and to be opened at other times. A full barred helmet covered the whole of the head, face, and neck. It had openings and slits in front to enable the wearer to breathe and see. The open helmet covered only the head, ears, and neck,

leaving the face uncovered. The form of the helmet varied from the simple skull cap to that surmounted with a lofty ridge and crest or plume. The crest was frequently made of horse-hair, and sometimes the helmet had two or even three crests. The Anglo-Saxon helmet was merely a conical cap with a nasal piece which afterward became improved into a face guard, visor, or beaver. The helmet is still worn as a protection to the head among soldiers; the military helmet, as now worn, does not cover or protect the face. In the United States helmets are worn by firemen to protect them from falling pieces of burning wood, when extinguishing fires. In tropical countries helmets are made of soft white felt, wrapped round with folds of linen, to protect the head of the wearer from the heat of the sun.

Helmet Shell (*Cassis*), a genus of gasteropods, type of a family (*Cassidæ*), the members of which are somewhat whelk-like and have thick, heavy shells, with bold ridges, a short spire and a long aperture, the outer lip toothed, the canal recurved. Numerous species, amounting to about 50, if we include closely allied genera such as *Cassidaria*, occur in the warmer seas. As the shells are made up of differently-colored layers, they are much used for the manufacture of cameos. The species most used is the large black helmet (*C. madagascarensis*), sometimes almost a foot long, with a whitish outer and black inner layer.

Helmholtz, Hermann=Ludwig Ferdinand (helm′hōlts), a German physicist; born in Potsdam in 1821. His work has been chiefly in those departments of physics which are in closest relation with physiology, notably in acoustics and optics. Of his many publications the best known are: "The Conservation of Force" (1847); "Manual of Optics" (1856–1866); "Popular Lectures on Scientific Subjects" (1873 and 1881), and "Sensations of Tone as a Physiological Basis for the History of Music." He was ennobled by the German emperor in 1883. He died in 1894.

Helmont, John Baptist van, a French physician; born in Brussels, in 1577. Perceiving the defects of the system of Galen, he announced his intention of reforming medicine. He boasted of having found the means of prolonging life, composed visionary theories on the constitution of man, and on diseases, and made some genuine discoveries in chemistry. He was probably the first to introduce the term "gas" into science, and was also first to observe the acid reaction of the gastric juice.

Helmstedt, a town of Germany, 24 miles E. of Brunswick; formerly famous for its Protestant university, founded by Julius, Duke of Brunswick, in 1574, and suppressed by Jerome Bonaparte in 1809.

Helmund, a river in Afghanistan, which it traverses diagonally N. E. to S. W., and ultimately falls into the extensive Lake Hamoon, after a course of about 550 miles. Its source is 11,500 feet above sea level.

Helocera (hel-ōs′er-a), a tribe of beetles having the antennæ terminated by a knob, of which the joints are sometimes pressed compactly together, sometimes so separated as to have a serrated appearance. The legs can fold into such a small compass as to allow the insect when alarmed to feign death. Both the larva and the perfect insects are found in cow-dung. The tribe is divided into two families, *Hisleridæ* and *Byrrhidæ*.

Heloderma (hel-ō-der′ma), a Mexican genus of lizards, of which one species at least, *H. horridum*, has been proved to be venomous, all its teeth being furnished with poison glands. It is about three feet in length, has a thick and squat body covered with rough scales, forms burrows under the roots of trees, is nocturnal in habit, and is said to feed on insects, worms, millepeds, etc.

Heloise, or Eloise. See ABELARD.

Helots, slaves in ancient Sparta. They were the property of the State, which alone had the disposal of their life and freedom, and which assigned them to certain citizens, by whom they were employed in private labors. Agriculture and all mechanical arts at Sparta were in their hands, and they were also obliged to bear arms for the State in case of necessity. They behaved with great bravery in the Peloponnesian war, and were rewarded with liberty (431 B. C.), but 2,000 appear to have been subsequently secretly massacred. They several times rose against their masters, but were always and finally reduced.

Helper, Hinton Rowen, an American author; born near Mocksville, N. C., Dec. 27, 1829. In 1857 appeared the notable work "The Impending Crisis of the South," which the Republican party used as a campaign document with great effect. "The Three Americas Railway" was published in 1881, and was followed by "Nojoque"; "The Negroes in Negroland"; "The Land of Gold"; "Oddments of Andean Diplomacy"; etc. He died March 9, 1909.

Helps, Sir Arthur, an English historian; born in Streatham, Surrey, July 10, 1813; was graduated at Cambridge in 1835. His works comprise an early volume of essays; "Thoughts in the Cloister and the Crowd" (1835); "Catherine Douglas, a Tragedy" (1839); "Essays written during the Intervals of Business" (1841); "Claims of Labor" (1844); the series entitled

"Friends in Council" (1847–1859); "Companions of my Solitude" (1851); "Brevia" (1871); "Conversations on War" (1871); "Thoughts on Government (1872); "Animals and Their Masters" (1873); "Social Pressure" (1875); "Spanish Conquest of America" (1855–1861); lives of "Pizarro" (1869); and "Cortes" (1871); "Realmah, a Romance" (1868); and "Ivan de Brion, a Russian story" (1874). He died in London, March 7, 1875.

Helsingfors, a seaport of Russia, capital of Finland, on a peninsula in the gulf of that name, 180 miles W. N. W. of St. Petersburg. Helsingfors is the residence of the governor, the seat of important courts and public offices, and contains a university removed from Abo in 1827. It has manufactures of linen, sail-cloth, and tobacco, an important trade in timber, corn, and fish, and one of the best harbors in the Baltic. Pop. (1905) 117,317.

Helst, Bartholomæus van der, a Dutch painter; born (according to tradition) in Haarlem in 1613. He was joint founder in 1654 of the painters' guild of St. Luke at Amsterdam. He attained great celebrity as a portrait-painter. Some of his pictures seem to bear traces of Franz Hals's influence. One of his works at Amsterdam, a "Muster of the Burgher Guard," with 30 full length figures, was pronounced by Sir Joshua Reynolds to be "the first picture of portraits in the world." His later creations are inferior in merit to the pieces painted before 1650. Numerous paintings by him exist in European galleries. He died in 1670.

Helvetic Confession, the name of a document drawn up by Martin Bucer in 1536 to settle the controversy between the Lutherans and the Zwinglians; and also of one drawn up by Bullinger (1566) at the request of Friedrich III., elector of the Palatinate, and adopted in Switzerland, the Palatinate, France, Hungary, Poland, and Scotland.

Helvetii (hel-vēsh'ē-ī), a Celtic people inhabiting, according to Cæsar, the region between the mountains of Jura on the W., the Rhone on the S., and the Rhine on the E. and N., the region corresponding pretty closely with the W. part of modern Switzerland. Their chief town was Aventicum, and they were divided into four *pagi* or cantons, of which the most important was the *pagus Tigurinus*. They are first mentioned in the war with the Cimbri, but the chief event in their history is their attempted irruption into and conquest of Southern Gaul, in which they were repulsed by Cæsar with frightful slaughter, 58 B. C.

Helvétius, Claude Adrien (el-vā-sē-üs'), a French encyclopædist, of Swiss origin; born in Paris in 1715; was trained for a financial career. He associated much with the French philosophers of the day, Diderot, D'Alembert, Holbach, and others. In 1758 appeared his celebrated work "On the Understanding," in which, carrying out, as he thought, the work of Locke, he endeavored to prove that sensation is the source of all intellectual activity, and that the grand lever of all human conduct is self-gratification. He died in Paris, Dec. 26, 1771.

HELVÉTIUS.

Helvoetsluys, or **Hellevoetsluis,** a fortified seaport of South Holland, on the Haring-Vliet, an arm of the Maas, 17 miles S. W. of Rotterdam. It has an excellent harbor, and is to Rotterdam and the mouth of the Maas what the Helder is to Amsterdam and the Zuider Zee. There is a school of navigation. Here William III. embarked for England, Nov. 11, 1688.

Hemans, Felicia Dorothea, an English poet; born in Liverpool Sept. 25, 1793. She displayed the bent of her genius when a mere child, and wrote some tolerable poetry in her ninth year. She first appeared as an author in 1808, in a volume entitled "Early Blossoms," but it was subjected to harsh criticism, which she took very seriously to heart. A second volume, published in 1812 under the name of "The Domestic Affections," was much more successful. The same year she married Captain Hemans. His health had suffered much during the retreat of Sir John Moore, and afterward at Walcheren; and shortly before the birth of her fifth son he left her on the alleged ground of seeking a more congenial clime in Italy, and though he lived long after never saw her again. The marriage had evidently proved unhappy. Thus abandoned, she resumed her literary pursuits with increased ardor, made herself acquainted with Latin and various modern languages, delighting especially in the poetic literature of Ger-

many, and wrote much both in separate works and in the periodicals of the time. At the suggestion of Reginald Heber, afterward Bishop of Calcutta, she turned her attention to the drama and wrote a tragedy entitled "The Vespers of Palermo," which, owing partly to the friendly exertions of Sir Walter Scott who wrote an epilogue for it, was favorably received at the Edinburgh Theater, though it had previously in 1823 proved unsuccessful at Covent Garden. Before this time she had added greatly to her popularity by her poems entitled "The Restoration of the Works of Art to Italy," "The Sceptic," "Modern Greece," and "Dartmoor." The last in particular, in 1821, gained the prize of the Royal Society of Literature. In 1825 she took up her residence at Rhyllon, near St. Asaph, where she wrote her "Lays of Many Lands," "Forest Sanctuary," and "Records of Woman." In 1828 she changed her residence to Wavertree, near Liverpool, where in 1830 she published one of her most popular volumes, entitled "Songs of the Affections." She had in 1829 visited Sir Walter Scott at Abbotsford, and in 1830 Wordsworth at Rydal Mount, and had left with each the impression of a singularly graceful and gifted woman. In 1831 she removed to Dublin. Her health had previously become infirm, but the claims on her exertion, more especially to provide for the education of her sons, had become more urgent than ever, and she was unable to enjoy that repose both of body and mind which was essential to her recovery. Part of 1833 was busily spent in preparing for the publication of three collections of her poems, entitled "Hymns for Childhood," "National Lyrics and Songs for Music," and 'Scenes and Hymns of Life"; but in 1834 she took scarlet fever, succeeded, in consequence of having caught cold, first by ague and finally by dropsy, which caused her death May 16, 1835. Her poetry is essentially lyrical and descriptive, and is always sweet, natural, and pleasing. In her earlier pieces she was imitative, but she ultimately asserted her independence and produced many short poems of great beauty and pathos and evidently destined to live. Mrs. Hemans had no dramatic power, her effusions being always intensely subjective.

Hematine, or **Hæmatine,** the red coloring matter of the blood, occurring in solution in the interior of the blood corpuscles or cells. It is the only structure of the body, except hair, which contains iron.

Hemiptera (hem-ip'ter-ä), a large order of insects to which the general term "bugs" is often applied, or the more modern title *Rhynchota,* in allusion to the characteristic suctorial proboscis. The order includes (1) forms with similar wings (Homoptera) — *e. g.,* coccus insects, aphides, cicadas; (2) others with dissimilar wings (Heteroptera) — *e. g.* water bugs, water-scorpions; and (3) parasites or lice.

Hemlock, a poisonous plant, *Conium maculatum,* natural order *Umbelliferaæ* supposed to be identical with the plant *kōneion* of the Greeks. It is a tall, erect, branching biennial, with a smooth, shining, hollow stem, usually marked with purplish spots, elegant, much-divided leaves, which when bruised emit a nauseous odor, and white flowers in compound umbels of 10 or more rays, surrounded by a general involucre of three to seven leaflets. It is common in the United States and is found in Great Britain and throughout Europe and temperate Asia in waste places, banks, and under walls. It is said to be fatal to cows when they eat it, but that horses, goats, and sheep may feed upon it without danger. In the human subject it causes paralysis, convulsions, and death. The poison administered to Socrates is supposed to have been a decoction of it, though others are of opinion that the potion was obtained from water-hemlock (*Cicūta virōsa*). Hemlock is a powerful sedative, and is used medicinally. The extract is considered the best preparation. It is often serviceable as a substitute for or an accompaniment to opium. It has been found very useful in chronic rheumatism and in whooping-cough, in allaying the pain of irritable sores and cancerous ulcers.

Hemlock, or **Hemlock Spruce,** a name given to an American fir (*Abies canadensis*) from its branches resembling in tenuity and position the common hemlock.

Hemorrhage. See BLEEDING.

Hemp (*Cannăbis satīva*), a plant, the only known species of the genus *Cannăbis,* natural order *Cannabinaceæ.* It is an annual herbaceous plant; the leaves are divided into five lanceolate and coarsely serrate leaflets; the male flowers, which are on separate stems, are green, resembling those of the hop; the female flowers are inconspicuous, and the fruit is a little hard capsule containing a single seed. It is a native of Western and Central Asia, but has long been naturalized in Brazil and tropical Africa, and is extensively cultivated in Italy and many other European countries, particularly Russia and Poland. The Indian variety, often known as *C. indica,* is the source of the narcotic drug variously known as hashish, bhang, or gunjah. The hemp fiber is tough and strong, and peculiarly adapted for weaving into coarse fabrics such as sail-cloth, and for twisting into ropes and cables. Immense quantities are exported from Russia. The finer sorts are used for shirtings, sheetings, etc., which, though coarser than that made from flax, are very much stronger and equally susceptible of being bleached. The

hemp of England is very superior but the plant does not pay the farmer, and very little of it is grown. In some of the United States it is a crop of considerable importance. The seed must be sown thin, not more than one or two bushels to an acre. Small paths are often left open along the field lengthwise, at about seven feet distant from each other, to allow the plucking of the male plants first, as the female require to remain standing a month longer to admit of the seed becoming ripe. But in some parts the whole crop is cut at once, plants for seed being separately cultivated. The plant being stripped of its leaves, and dried in the open air, may be stored, but when steeped green it turns out of a better color. The steeping takes from 4 to 11 days, and the operation is known to be completed by the inner reed or woody fiber separating easily from the fibers of the outer bark. When thoroughly steeped it is taken out of the water and spread out in rows on the grass to bleach. This takes three weeks or more, during which period it requires constant turning with a light, long pole. After drying it is scutched or broken by breaks and scutching-stocks, resembling those employed for flax. Beating is the next operation, which separates the "boon" from the fiber. Hempseed is much used as food for cage-birds, and also yields an oil. Sisal hemp or (henequen) and Manilla hemp are not true hemps.

The United States imports $500,000 worth of hemp yearly from Italy and Russia. The best comes from Italy. Great care is taken in its culture and it is plowed twice, with an interval of 15 days. In favorable soils from 1,700 to 2,000 pounds an acre are produced. Raw hemp grown in Japan is sold in ribbons, thin as paper and glossy as satin, the frayed ends showing fibers of exceeding thinness.

Hemp Palm, a Chinese and Japanese species of palm (*Chamærops excelsa*), of the fibers of whose leaves cordage is made, while hats and even cloaks are made from the leaves themselves.

Henderson, a city and county-seat of Henderson co., Ky., on the Ohio river, and on the Louisville and Nashville the Illinois Central, and the Louisville, Henderson, and St. Louis railroads: 10 miles S. of Evansville, Ind. It is in a rich timber, coal, and salt region; has regular steamboat connection with Louisville, Memphis, and other points; and ships large quantities of tobacco and grain. It contains several tobacco and cigar factories, foundries, car-works, carriage and wagon factories, waterworks, handsome fair-grounds, grist, saw, and planing mills, woolen and churn factories, daily and weekly newspapers, a National bank, electric lights, and street railways, and an assessed property valuation of over $5,000,000. Pop. (1900) 10,272; (1910) 11,452.

Henderson, David Bremner, an American statesman; born in Old Deer, Scotland, March 14, 1840; was brought to the United States when a boy and educated in the public schools. He entered the Union army as a private in 1861, and became a colonel of volunteers in 1864. He was admitted to the bar in 1865; was first elected to Congress in 1882, where for 10 years he was a member of the Committee on Appropriations; and in the 54th and 55th Congresses was respectively Chairman of the Committee of Judiciary, and a member of the Committee on Rules. On Dec. 4, 1899, he was elected Speaker of the House of Representatives, to succeed Thomas B. Reed, and in 1901 he was re-elected. He died Feb. 25, 1906.

Henderson, William James, an American musical critic; born in Newark, N. J., Dec. 4, 1855; was connected with the New York "Times." He wrote: "Story of Music"; "Preludes and Studies"; "Sea Yarns for Boys"; "Afloat With the Flag"; "The Orchestra and Orchestral Music"; etc.

Hendricks, Thomas Andrews, Vice-President of the United States; born near Zanesville, O., Sept. 7, 1819; was graduated at South Hanover College, Indiana, in 1841; went to Chambersburg, Pa., studied law in the office of his uncle and was admitted to the bar in 1843. In 1845 he was sent to the Legislature, and in 1850 and 1852 was elected to Congress. In 1860 he was the Democratic candidate for governor of Indiana, but was defeated by Henry S. Lane. In 1863–1869 he was a United States Senator; and at the Democratic National Convention of 1868, received 132 votes (second highest) for the presidential nomination. In the same year he was again defeated for the governorship of Indiana, but in 1872 was elected. In the Democratic National Convention of 1876 he received 133½ votes for the presidential nomination, and a practically unanimous vote for the vice-presidential. The Democratic ticket, headed by Tilden, was, however, defeated. In 1884 Hendricks was again nominated for the vice-presidency, and this time the Democrats were victorious, and Cleveland and Hendricks were elected. He died in Indianapolis, Ind., Nov. 25, 1885.

Hengist (heng'gist), a prince of the Jutes, founder of the Kingdom of Kent in Great Britain, in conjunction with his brother Horsa. In 449 the Britons sued for aid from the Saxons against the inroads of the Scots and Picts. The Sax-

ons under Hengist and Horsa accordingly landed at the mouth of the Thames, and defeated the northern tribes near Stamford in 450 A. D. Being reinforced from home they afterward united with the Scots and Picts against the Britons, whom they ultimately dispossessed. Hengist, who had lost his brother in the battle near Eglesford (now Ailsford) in A. D. 445, founded the Kingdom of Kent, established his residence in Canterbury, and died about the year 488. By some recent writers the brothers are, with insufficient reason, regarded as mythical personages.

Heng-kiang (heng-kē-ang′), a river of China, falling from the N. W. into the Yang-tse-kiang. In its course of 300 miles it has several large cities on its banks.

Henley, William Ernest, an English poet and editor; born in Gloucester, Aug. 23, 1849. Months of sickness in Edinburgh Infirmary (1873–1875) bore fruit in "A Book of Verses" (1888), which won much attention, and was followed by "Views and Reviews" (1890); "The Song of the Sword" (1892); "English Lyrics" (1897); "Poems" (1898); etc. He has also been editor of the "Magazine of Art"; the "Scots (or "National") Observer"; and the "New Review"; besides editing Burns and Byron. He collaborated with R. L. Stevenson in three plays: "Deacon Brodie"; "Beau Austin"; and "Admiral Guinea." He died July 12, 1903.

Henley-on-Thames, a municipal borough of Oxfordshire, at the base of the Chiltern Hills, and on the left bank of the Thames; 36 miles W. of London. The five-arch bridge was built in 1786 at a cost of $50,000. Malting is a principal branch of industry; there are also breweries, and a considerable trade in corn, flour, and timber. The principal amateur regatta of England has been held here every summer since 1839.

Henna, a shrub (*Lawsonia inermis*), natural order *Lythraceæ*, bearing opposite entire leaves and numerous small, white fragrant flowers disposed in terminal panicles. Externally it bears considerable resemblance to the European privet. It grows in moist situations throughout North Africa, Arabia, Persia, and the East Indies and has acquired celebrity from being used by the inhabitants of those countries to dye yellow the nails of their fingers and the manes, hoofs, etc., of their horses.

Hennepin, Louis, a French recollet friar, missionary, and traveler in North America; born in Flanders about 1640. He entered a convent and being sent by his superiors to Calais and Dunkirk the stories he heard from the sailors inspired him with a desire to visit distant countries. At length he embarked for Canada and arrived at Quebec in 1675. Between that period and 1682 he explored the regions afterward called Louisiana, and returning to Europe, published an account of his researches, entitled "Description de la Louisiane nouvellement découverte au sud-ouest de la Nouvelle France, avec la Carte du Pays, les Mœurs et la Mainère de Vivre des Sauvages" (Paris 1683). This was followed by a work entitled "Nouvelle découverte d'un très-grand Pays situé dans l'Amérique entre le Nouveau Méxique et la Mer Glaciale" (1697); and another, "Nouveau Voyage dans un Pays plus grand que l'Europe, entre la Mer Glaciale et le Noveau-Méxique" (1698), which are continuations of the first. The geographical portions of his works are feeble but they present much interest as descriptions of the manners of the aboriginal races which the author visited. He died in Utrecht about 1706.

Henningsen, Charles Frederick, an American military officer; born in England in 1815. He went to Nicaragua in 1856, where he was appointed Brigadier-General and distinguished himself in the defense of Granada, and in the victory at Queresma. During the American Civil War he served in the Confederate army, becoming a Brigadier-General. He directed the construction of the first Minie rifles manufactured in the United States. His publications include "Eastern Europe"; "Past and Future of Hungary"; "Sixty Years Hence"; "Personal Recollections of Nicaragua"; etc. He died in Washington, D. C., June 14, 1877.

Hennessy, John, an American clergyman; born in Ireland, Aug. 20, 1825; came to the United States in 1847, and pursued his theological studies in Carondelet seminary, near St. Louis. After arduous labors as a Roman Catholic missionary in Missouri he became professor in Carondelet seminary in 1854, president in 1857; afterward pastor in St. Joseph, Mo.; Bishop of Dubuque in 1866; and Archbishop in 1893. He died in Dubuque, Ia., March 4, 1900.

Hennil (hen′il), an idol of the Vandals. It was represented as a stick surmounted with a hand holding an iron ring.

Henotheism, a name introduced by Max Müller for a phase of religious belief when each divinity seems to stand alone, and to be adored and prayed to, to the exclusion of the rest.

Henri, R. C. See Le Roux.

Henrietta, Maria, queen of Charles I. of England; youngest child of Henry IV., of France, by his second wife, Maria de' Medici; born in Paris in 1609. The proposed marriage between Charles, Prince of Wales, and the Infanta of Spain having failed, a matrimonial negotiation was opened with Henrietta, whom he had first met at a ball in Paris while on his way to Spain.

The marriage was celebrated by proxy at Paris in 1625, but her first popularity in England was soon destroyed by her bigotry, hauteur, and despotic ideas as to divine right. Much of the subsequent procedure which brought Charles to the block may be traced indirectly to her influence. On the breaking out of civil war she proceeded to Holland, procured money and troops, and afterward joined Charles at Oxford. She again went to the Continent in 1644, and resided in France till the Restoration. On that occasion she visited England, but soon returned to France, and died near Paris in 1669.

HENRIETTA MARIA.

Henrietta, Duchess of Orleans, daughter of Charles I.; born June 16, 1644. Her mother, Henrietta Maria, had to leave her behind at Exeter, which in April, 1646, was taken by Fairfax; but three months afterward, disguised as a French beggar-woman, her governess, Lady Dalkeith, escaped with her from Oatlands to Calais. Her mother brought her up a Catholic. Gay, brilliant, beautiful, in 1661 she was married to Louis XIV.'s only brother, Philip, Duke of Orleans; "of all the love he had borne her there soon remained nothing but jealousy." As Louis's ambassadress, in 1670 she wheedled Charles II. into signing the secret treaty of Dover; and she had been back in France little more than a fortnight, when on June 30 she died at St. Cloud — almost certainly of poison, but possibly without her husband's cognizance.

Henry, a name borne by various European rulers as follows:

ENGLAND.

Henry I., surnamed Beauclerc ("fine scholar"), youngest son of William the Conqueror; born in Selby in Yorkshire, in 1068. He was hunting with William Rufus when that prince was killed, in 1100, and instantly riding to London, caused himself to be proclaimed king, to the prejudice of his elder brother Robert, then absent as a Crusader. He reëstablished by charter the laws of Edward the Confessor, recalled Anselm to the primacy, and married Matilda, daughter of Malcolm III. of Scotland, thus conciliating in turn the people, the Church, and the Scots. Robert landed an army, but was pacified with a pension, and the promise of succession in event of his brother's decease. Soon after, however, Henry invaded Normandy, took Robert prisoner in 1106, and reduced the duchy. He was successful also in the struggle with France. The last years of his reign were very troubled. In 1120 his only son William was drowned in returning from Normandy, where, three years later, a revolt occurred in favor of Robert's son. The Welsh also were a source of disturbance. Henry appointed as his heir his daughter Matilda or Maud, whom he had married first to the Emperor Henry V., and then to Geoffrey Plantagenet of Anjou. Henry died at Rouen in 1135, and was succeeded by Stephen.

HENRY I. OF ENGLAND.

Henry II., first of the Plantagenet line, born in Normandy in 1133, son of Geoffrey, Count of Anjou, and Matilda, daughter of Henry I. He was invested with the Duchy of Normandy, by the consent of his mother, in 1150; in 1151 he succeeded to Anjou and Maine, and by a marriage with Eleanor of Guienne gained Guienne and Poitou. In 1152 he invaded England, but a compromise was effected, by which Stephen was to retain the crown and Henry to succeed at his death, which took place in 1154. The commencement of his reign was marked by the dismissal of the foreign mercenaries; and though involved with his brother, Godfrey, who attempted to seize Anjou and Maine, and in a temporary dispute with France, he reigned prosperously till the contest with

Thomas Becket regarding the Constitutions of Clarendon. Though sufficiently submissive after Becket's death in the way of penance and expiation, Henry only gave up the article in the Constitutions of Clarendon which forbade appeals to the court of Rome in ecclesiastical cases. Before this matter was terminated, Henry, in 1171, completed the conquest of Ireland, a great part of which had been reduced by Richard de Clare, Earl of Pembroke, commonly known as Strongbow. Henry's last years were embittered by his sons, to whom he had assigned various territories. The eldest son, Henry, who had been not only declared heir to England, Normandy, Anjou, Maine, and Touraine, but actually crowned in his father's lifetime, was induced by the French monarch to demand of his father the immediate resignation either of the kingdom of England or of the dukedom of Normandy. Queen Eleanor excited her other sons, Richard and Geoffrey, to make similar claims; Louis and William of Scotland gave them support; and a general invasion of Henry's dominions was begun in 1173 by an attack on the frontiers of Normandy, and an invasion of England by the Scots, attended by considerable disturbance in England. Conciliating the Church by his penance, Henry took prompt action; William of Scotland was captured, and an accommodation arrived at with Henry's sons. These, however, once more became turbulent, and though the deaths of Henry and Geoffrey reduced the number of centers of disturbance, the king was forced to accept humiliating terms from Richard and Philip of France. He died shortly after at Chinon in 1189. He ranks among the greatest English kings both in soldiership and statecraft.

HENRY III., eldest son of King John and Isabella of Angoulême; born in Winchester, in 1207. He succeeded his father in 1216. The regency was intrusted to William Marshal, Earl of Pembroke, who, in 1217, defeated the French army at Lincoln, and compelled the dauphin Louis to retire to France. On Pembroke's death, in May, 1219, Hubert de Burgh and Peter des Roches, Bishop of Winchester, became regents; but mutual jealousies and dissensions disturbed their administration and weakened their power. Henry was crowned a second time, in 1220, and two years later was declared of age, but his feebleness of character unfitted him to rule, and the real power remained with his ministers. His fondness for foreign counsellors, his unsuccessful wars with France, and his attempts to govern without parliaments, excited much ill-humor in the nation. This was increased by the heavy impositions on his subjects, made necessary by his acceptance of the crown of Sicily for his son Edmund. At length, in 1258, he was virtually deposed by the "Mad Parliament," which assembled at Oxford, and a council of state was formed under the presidency of Simon de Montfort. The popular leaders quarreled among themselves, while the king was a prisoner in their hands. But in 1262 civil war began, the king being compelled to employ foreign mercenaries. In 1264 the battle of Lewes was fought, at which the king, Prince Edward, Earl Richard, king of the Romans, and his son Henry, were made prisoners by the barons. Soon after, De Montfort, now virtually sovereign, summoned a Parliament, which met in January, 1265, and was the first to which knights of the shires and representatives of cities and boroughs were called; thus constituting the first House of Commons. In August of that year, De Montfort was defeated and killed by Prince Edward, at the battle of Evesham, and the king regained his liberty. But the war lasted two years longer. In 1270 Prince Edward set out on the crusade, and before his return Henry died at Westminster, Nov. 16, 1272.

HENRY III. OF ENGLAND.

HENRY IV. (called Bolingbroke), Duke of Hereford, and eldest son of John of Gaunt, Duke of Lancaster; born in Bolingbroke in Lincolnshire, 1366. Having impeached Thomas Mowbray, Duke of Norfolk, of treason, a day was set aside for the two rivals to decide their feud by single combat. Richard, however, dreading the consequences that might arise from the resort to arms of such powerful barons, on the day of trial forbade the battle, and banished both nobles from the realm; Norfolk for life, and Bolingbroke, as Hereford, his cousin, was called, for 10 years. The death of his father, and the discontent of the people at the bad government of Richard, gave Here-

Henry

ford an excuse to return to England long before the expiration of his term, on the double plea of obtaining the dukedom of Lancaster, and to assist Richard to rule with greater discretion. The people, weary of the authority of the state, hailed the return of Bolingbroke with every demonstration of delight, and flocked round him in thousands; so that, by judiciously taking advantage of the tide of public opinion, Bolingbroke was carried by universal acclaim to the crown for which his ambition so eagerly panted; and, after having deposed his cousin, Richard II., in 1399 accended the throne as Henry IV. This usurpation gave rise to the civil war between the houses of York and Lancaster, which broke out under the sway of Henry VI. His reign was disturbed by a rebellion headed by the Duke of Northumberland and his son Percy, surnamed "Hotspur." After subduing all opposition, Henry IV. died overwhelmed with remorse for many of his unscrupulous deeds, in 1413.

Henry V. (surnamed Monmouth), one of the most illustrious of the line of English sovereigns, and whose early life of riot and

HENRY V. OF ENGLAND.

dissipation gave but little promise of his after virtues; born in 1388, ascended the throne on the death of his father, Henry IV. In obedience to the dying advice of his parent, to give the public mind employment, he declared war against France, laying claim to that throne in right of his ancestors, and at once led a powerful army to the invasion of that kingdom; and after taking Harfleur and devastating the northern provinces, fought and won the glorious battle of Agincourt. To check Henry's further progress and avert the total ruin of his country, the French monarch concluded a truce with Henry, who, to ratify the arrangement, espoused Charles's daughter, the Princess Catharine. No king ever sat on the English throne who was more beloved and honored than the gallant Harry "Monmouth." He died in 1422.

Henry VI., the only son of the above; born 1421, was but ten months old at the death of his father, and was proclaimed king on the day after that event. His grandfather, Charles VI., King of France, died soon after, and the Duke of Orleans assumed the title of king by the name of Charles VII. This renewed the war between England and France, and the English, for a while, were successful. Henry was crowned at Paris, and the great Duke of Bedford, his guardian, obtained several important victories. But the raising of the siege of Orleans by Joan of Arc gave a new turn to affairs, and the English power declined, and was, in the end, quite subverted. The death of the Duke of Bedford was a fatal blow to the cause of Henry; and, to add to his misfortunes, the York party in England grew strong, and involved the country in a civil war. They adopted the white rose as their badge of distinction, and the Lancastrians the red. Hence the title given to the struggle — "the War of the Roses." After various contests, the king was defeated and taken prisoner. However, his wife, Margaret of Anjou, carried on the war with spirit, and for some time with considerable success. Richard, Duke of York, was slain at Wakefield, and Henry recovered his liberty; but Edward, Earl of March, son of Richard, laid claim to the crown, and routed the queen's forces at Ludlow, but was himself afterward defeated at St. Alban's. At length the York party prevailed, and Henry was sent to the Tower, where it is believed, he was slain by Richard, Duke of Gloucester. He was found dead in the Tower in 1471.

Henry VII. (Tudor), son of Edmund, Earl of Richmond, and of Margaret, of the house of Lancaster, born in 1456. By the assistance of the Duke of Brittany, he landed in Wales with some troops, and laid claim to the crown in 1485. The people, disgusted at the cruelties of Richard III., joined him in such numbers that he was enabled to give the usurper battle at Bosworth Field, where Richard was slain, and Henry crowned on the spot. He united the houses of York and Lancaster by marrying Elizabeth, daughter of Edward IV. His reign met with little disturbance, except from two impostors, set up by Lady Margaret, sister to Edward IV. One was a joiner's son,

called Lambert Simnel, who personated Richard, Duke of York, who had been murdered by the Duke of Gloucester in the Tower. On being taken prisoner, Henry made him a scullion in his kitchen. The other was Perkin Warbeck, who said he was the Duke of York; but he was soon taken and hanged at Tyburn. Henry reigned 24 years, and greatly increased trade

HENRY VIII. OF ENGLAND.

and commerce; but his avarice was excessive. He died in 1509.

HENRY VIII., born in 1491; succeeded his father, Henry VII., at the age of 19. The first years of his reign were auspicious owing to his generosity; but at length his conduct grew capricious and arbitrary. The Emperor Maximilian and Pope Julius II., having leagued against France, persuaded Henry to join them, and he, in consequence, invaded that kingdom, where he made some conquests. About the same time, James IV., King of Scotland, invaded England, but was defeated and slain at Flodden Field. Cardinal Wolsey succeeded in bringing Henry over from the imperial interests to those of the French king. When Luther commenced his reformation in Germany, Henry wrote a book against him, for which he was complimented by the Pope with the title of "Defender of the Faith." But this attachment to the Roman see did not last long; for, having conceived an affection for Anne Boleyn, he determined to divorce his wife, Catharine of Aragon, to whom he had been married 18 years. His plea for the divorce was that Catharine was his brother Arthur's widow. The divorce being refused by the Pope, Henry assumed the title of Supreme Head of the English Church, put down the monasteries, and alienated their possessions to secular purposes. His marriage with Anne Boleyn followed; but he

afterward sent her to the scaffold, and married Lady Jane Seymour, who died in childbed. He next married Anne of Cleves; but she not proving agreeable to his expectations, he put her away, and caused Cromwell, Earl of Essex, the projector of the match, to be beheaded. His next wife was Catharine Howard, who was beheaded for adultery; after which he espoused Catharine Parr, who survived him. He was a man of strong passions and considerable learning. The historian Froude has vindicated his memory in many respects. He died in 1547.

FRANCE.

HENRY I., born in 1004, succeeded his father, Robert I., in 1031, and died in 1060, after a reign of 23 years, frequently disturbed by civil and foreign wars.

HENRY II., son of Francis I. and his queen, Claude, born 1518. His marriage with Catharine de Medicis was celebrated at Marseilles, in 1533, by her uncle, Pope Clement VII. Henry succeeded his father in 1547, and at once made a complete change in the court and ministry. The most influential persons in his reign were the Cardinal of Lorraine and his brother Francis, Duke of Guise, the Constable de Montmorenci, the Marshal de St. André, and Diana of Poitiers, the king's favorite mistress, whom he made duchess of Valentinois. He carried on war with England, and recovered Boulogne for France; war with the Pope and with Spain; fighting for the Protestants in Germany, while he persecuted them in France; acquired by conquest Metz, Toul, and Verdun, and retained them under the

HENRY II. OF FRANCE.

treaty of Chateau-Cambresis, which closed the war in 1559. By the same treaty Calais was confirmed to France. The siege of Metz by Charles V., and its defense by the Duke of Guise; the battle and siege of Renti; the great victory of the Spaniards at St. Quentin; and the battle of Gravelines, are the chief military events of this reign.

Mary, the young queen of Scots, was brought to France about 1549, and betrothed to the dauphin François. Henry died in July, 1559, from the effects of a wound accidentally inflicted by the Count of Montgomery at a splendid tournament a few days before.

HENRY III., third son of Henry II. and Catharine de Medicis; born in 1551. He was first known as Duke of Anjou, and distinguished himself as a soldier at the battles of Jarnac and Moncontour. He was elected King of Poland in 1573, but being proclaimed King of France on the death of Charles IX., in 1574, he escaped, not without risk, from Poland, and returned to France. The country was distracted with the conflicting factions, and wasted with civil war; and the king, feeble in character and self-indulgent, was governed by ignoble favorites. The famous Catholic League was formed, with the Duke of Guise at its head; Henry of Navarre put himself at the head of the Huguenots, and won the battle of Coutras; Paris fell into the power of the League in 1588, and the king fled to Chartres and Rouen; later in the same year he convoked the states-general at Blois, and there had the two Guises assassinated, a crime which excited the revolt of Paris and the principal cities of the kingdom. The Duke of Mayenne was named by the League lieutenant-general of the royal estate and crown of France, and Henry, roused at last to action, joined his rival, Henry of Navarre, and advanced to besiege Paris. At St. Cloud, which he made his headquarters, he was stabbed by a fanatic, Jacques Clement, and died the day after, Aug. 1, 1589. Henry III. left no children, and was the last sovereign of the Valois line.

HENRY IV. (Quatre), called The Great, King of France and Navarre; born in 1553 in Pau, in Béarn. His father, Anthony of Bourbon, was descended from a son of Louis IX.; his mother was Jeanne d'Albret, daughter of Henry, King of Navarre. He was brought up in the simple and hardy manner of the peasantry of Béarn, and thus laid the foundation of a vigorous constitution and temperate habits. When the perfidious design of destroying the Huguenot chiefs by a massacre was formed by Charles IX. and his mother, Catherine, one of their means to lull suspicion was to propose to Queen Jeanne a marriage between Henry and Margaret of Valois, the king's youngest sister. While preparations were making for the marriage festival, Henry's mother died at Paris, not without strong suspicions of poison. Having assumed the title of King of Navarre, his marriage took place, Aug. 18, 1572. Then followed the horrible scenes of St. Bartholomew, Aug. 24. Henry was obliged to make a profession of the Catholic faith to save his life; but Catherine of Medicis endeavored to dissolve the marriage just celebrated. As she was unsuccessful in this, she adopted the plan of corrupting the noble youth by the pleasures of a licentious court; and he did not escape the snare. In 1576, however, he took advantage of a hunting excursion to quit the court, and professed himself again of the Protestant Church. Catherine, who after the decease of Charles IX. administered the government in the name of his successor Henry III., now thought it advisable to conclude a treaty of peace with the Huguenots (1576), securing to them religious freedom. Exasperated by this event, the Catholics formed the celebrated League, which Henry III. was obliged to confirm; and the religious war was recommenced. In 1587 Henry obtained a victory over the Catholics at Coutras, in Guienne. In 1589, on the assassination of Henry III., Henry of Navarre succeeded to the throne; but he had to secure his claim by hard fighting and by the profession of the Catholic faith. The same year he won the victory of Arques, and the following year that of Ivry, over the forces of the League, headed by the Duke of Mayenne. After a protracted and obstinate struggle, convinced that he should never enjoy quiet possession of the French throne, without professing the Catholic faith, Henry at length yielded to the wishes of his friends, was instructed in the doctrines of the Roman Church, and professed the Catholic faith, July 25, 1593, in the Church of St. Denis. He happily escaped an attempt to assassinate him; was solemnly anointed king at Chartres in 1594; and entered the capital amid the acclamations of the people. Peace was not fully reëstablished till 1598, when the treaty of Vervins was signed. Henry made use of the tranquillity which followed to restore the internal prosperity of his kingdom, and particularly the wasted finances; and in this design he was highly successful, with the aid of his prime minister, Sully. To his former brothers in faith and in arms, the Protestants, he granted a certain measure of religious freedom and political security by the edict of Nantes, in 1598. In 1610, while riding through the streets of Paris, his coach was obstructed in the Rue de la Feronnerie by two wagons. A fanatic named Ravaillac took advantage of the moment to perpetrate a long meditated deed; and the king received a fatal stab from the hand of this assassin, in the 52d year of his age and 22d of his reign.

HENRY V. OF FRANCE. See CHAMBORD.

GERMANY.

HENRY I., surnamed the Fowler, Emperor of Germany, born in 876, was the son of Otho, Duke of Saxony, and elected to the imperial dignity in the year 918. He re-

Henry

united the German princes, and subdued the Hungarians, formed good laws, and built several cities. He vanquished the Bohemians, the Sclavonians, and the Danes, and conquered the kingdom of Lorraine. He died in 936.

HENRY II., great-grandson of the preceding; born 927. He succeeded his father as Duke of Bavaria, and in 1002 was elected King of Germany, and crowned at Mentz and at Aix-la-Chapelle. Two years later he was crowned King of Lombardy at Pavia, his rival, Hardouin, avoiding a combat with him. He was engaged in frequent wars, in Italy, in Bohemia, Bavaria, etc. In 1014 he received the imperial crown at Rome, his wife Cunegunde being crowned with him. They were both distinguished for their piety and devotion to the Church, and were canonized. He died in 1024.

HENRY III., son of the Emperor Conrad II.; born in 1017; succeeded his father in the imperial dignity in 1039. Nature had given him the talents, and education the character, suitable for an able ruler. In everything he undertook he displayed a steady and persevering spirit; the clergy were compelled to acknowledge their dependence on him, and the temporal lords he held in actual subjection. He deposed three popes, and raised Clement II. to the vacant chair; and he was as successful in his wars as in his administration. He died in 1056.

HENRY IV., son of the preceding; born in 1050, and at the death of his father was only five years old. His mother, Agnes, was made regent, and on her death the chief power was seized by his uncles, the Dukes of Saxony and Bavaria. Henry made war on them and threw off their yoke. He, however, offended his subjects by the licentiousness of his manners, and quarreled with the Pope, Gregory VII., about investitures. The latter being appealed to in a subsequent dispute between Henry and the Duke of Saxony, cited Henry to his tribunal, who then deposed the Pope, to be in turn excommunicated by him. The emperor was compelled to submit, went to Canossa, where the Pope then was, and after being kept three days in the courtyard, received absolution. The quarrel was soon renewed, deposition, excommunication, and election of new popes and emperors followed. Henry's eldest son, Conrad, rebelled against him, but was overcome, and died in Florence in 1101. He then caused his second son, Henry, to be elected his successor, and crowned; but the latter also rebelled, and making himself master of his father's person, in 1106, by stratagem, compelled him to abdicate the throne. Henry IV. died in 1106.

HENRY V., the son and successor of the preceding; born in 1081. In 1106 he rebelled against his father and dethroned him, assuming the imperial crown in his stead. In 1111 he married Matilda, the daughter of Henry I., King of England; and the rich dowry he received with his princess gave him the means of undertaking an expedition to demand the imperial crown from the Pope. Finding that Pascal

HENRY IV. OF FRANCE.

refused to crown him, Henry caused the Pope to be conveyed away from the altar while at mass; and cut down, in the streets of Rome, all who opposed him. At length the Pope yielded, and Henry was crowned

HENRY V. OF GERMANY.

in 1112, without making any new concessions. Soon after his return to Germany the Pope excommunicated him; which led to a new war, the invasion of Italy, and the election of a rival Pope. Peace was not made till 1122, when the emperor renounced his claims. He died in 1125.

Henry VI., son of Frederick Barbarossa; born in 1165. He was elected King of the Romans when four years of age, and succeeded his father on the imperial throne in 1190. The same year, on the death of William II., King of Sicily, he claimed that crown in right of Constance his wife, daughter of King Roger. After being crowned at Rome with his wife in 1191, he made an unsuccessful attempt to conquer Naples. In 1193 he gave Leopold, Duke of Austria, a small price to hand over to his keeping his royal prisoner, Richard I. of England, whom he detained nearly a year and released for a heavy ransom. With this money he undertook another expedition against Sicily, and succeeded. He was crowned at Palermo in 1194. A revolt broke out in consequence of his tyranny, and he returned to suppress it. He died in Messina in 1197.

Henry VII., succeeded Albert I. in 1308. He undertook an expedition to Italy, and compelled the Milanese to crown him King of Lombardy. He then suppressed a revolt which had broken out in Upper Italy; took several cities by storm; and, having captured Rome, he was crowned Roman emperor by the cardinals sent from Avignon, while in the streets the work of murder and pillage was still going on. He died in 1313.

Henry, Prince of Prussia, a German naval officer; born in Berlin, Aug. 14, 1862; brother of Emperor William; married Princess Irene, daughter of the late Grandduke Ludwig IV. of Hesse, May 24, 1888; was appointed to succeed Vice Admiral von Diederichs in command of the German fleet in Chinese waters, in March, 1899. Early in January, 1902, Emperor William requested President Roosevelt's permission for his daughter, Alice, to christen the Emperor's new yacht building in the United States. Later in the same month, after receiving the consent of President Roosevelt, the Emperor telegraphed an expression of his gratification, and informed the President that he had ordered his yacht, the "Hohenzollern," to be present at the ceremony, and had appointed his brother, Admiral Prince Henry of Prussia, to represent him on the occasion. Prince Henry arrived in New York city on Feb. 23 and left on March 12. He was the recipient of hearty national, municipal, and social honors, and won the esteem of the American people by his cordiality.

Henry, surnamed The Lion, Duke of Saxony and Bavaria; born in 1129. He was the son of Henry the Proud, and the head of the Guelphs. After Bavaria, which had been taken from his father, was restored to him (1154) by the Emperor Frederick I., he became the most powerful noble in Germany, his possessions extending from the North Sea and the Baltic to the shores of the Adriatic. He died in 1195.

Henry, surnamed The Navigator, a Portuguese prince; born in Oporto in 1394. The ambition of Henry was the discovery of unknown regions of the world. At Sagres he erected an observatory, to which he attached a school for the instruction of youthful scions of the nobility in the sciences necessary to navigation. Subsequently he dispatched some of his pupils on voyages of discovery, which resulted at last in the discovery of the Madeira Islands in 1418. Henry's thoughts were now directed toward the auriferous coasts of Guinea, of which he had heard from the Moors; and in 1433 one of his mariners sailed round Cape Nun, till then regarded as the farthest point of the earth, and took possession of the coasts as far S. as Cape Bojador. Next year Henry sent out a larger ship, which reached a point 120 miles beyond Cape Bojador; and at last, in 1440, Cape Blanco was reached. Henry died in 1460.

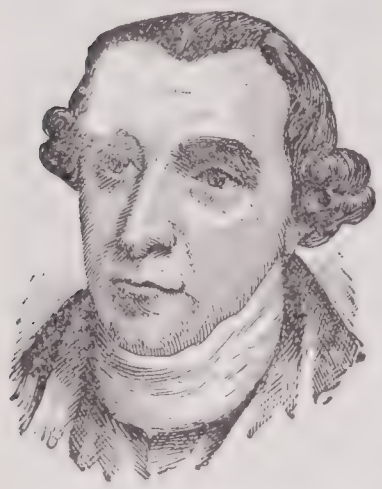
Henry of Huntingdon, an English chronicler; was brought up in the household of the Bishop of Lincoln, and about 1120 became Archdeacon of Huntingdon. His great work is a "History of the English," coming down to 1154.

Henry, Joseph, an American physicist; born in Washington, D. C., Dec. 17, 1797; received a common school education; later turned his attention to the study of science; discovered how to produce the electromagnet, about 1827; and afterward greatly improved it. He built the first electromagnetic telegraph, about a mile long, in 1830; designed the first electro-magnetic engine in 1831; was connected with the Smithsonian Institution in 1846–1878; was twice offered the presidency of Princeton College, and had other tempting offers to leave Washington, but refused them all to give his time to the equipment and care of the Smithsonian Institution. He was the author of "Syllabus of Lectures on Physics" (1844), and of more than 150 papers on scientific subjects. He died in Washington, D. C., May 17, 1878.

Henry, Matthew, a British divine; born in Flintshire, Wales, in 1662. He was one of the 2,000 ministers who seceded from the Church of England upon the passage of the Act of Uniformity. He began the preparation of a work, entitled "An Exposition of the Old and New Testaments," but only lived to complete the Acts of the Apostles. He died in 1714.

Henry, Patrick, an American patriot; born in Hanover co., Va., May 29, 1736. He entered business and married at 18. Having failed successively in "store-keeping" and in farming, he became a lawyer in 1760, and three years later found his oppor-

tunity, when, having been employed to plead the cause of the people against an unpopular tax, his great eloquence seemed suddenly to develop itself. This defense placed him at once in the front rank of American orators, and his later speeches advanced him to their head. Throughout the Revolutionary War he was a zealous patriot. He was a delegate to the 1st Continental Congress, which met in Philadelphia in 1774, and delivered the first speech in that assembly — a speech that for fiery eloquence and lofty tone was worthy of so momentous a meeting. In 1776 he carried the vote of the Virginia convention for independence; and in the same year he became governor of the new State. He was afterward four times reëlected. In 1791 he retired from public life, and returned to his practice; in 1795 he declined the secretaryship of State offered him by Washington. He died June 6, 1799.



PATRICK HENRY.

Henry, William Arnon, an American agriculturist; born in Norwalk, O., June 16, 1850; acquired a collegiate education; became Professor of Botany and Agriculture in the University of Wisconsin in 1881, Director of the Agricultural Experiment Station in 1887, and Dean of the College of Agriculture in 1891-1907.

Henry Documents, a series of papers bearing on early American history. Sir James H. Craig, the governor of British North America, in January, 1809, sent an adventurer, John Henry by name, into the New England States to report the feeling of that section of the country on the question of secession from the Union, and possibly to increase the discontent already caused among these people of commercial interests by the Embargo Act and the Non-Intercourse system of the government. Failing of the reward he sought from the British ministry, Henry sold to President Madison for $50,000 his correspondence with the English officials, and these papers became known as the Henry documents. Madison submitted the letters to Congress and claimed that they proved a design on the part of England to annex the New England States. They do not make certain, however, that the Eastern States entertained seriously the idea of secession.

Henry, Fort, a defensive work on the Tennessee river, about 8 miles W. of Fort Donelson. It surrendered to General Grant and Commodore Foote, Feb. 6, 1862.

Henry, Fort, an ancient fort erected on the site of the present town of Petersburg, Va., in 1646.

Hensel, Luise (hen'sel), a German religious poet; born in Linum, Brandenburg, March 30, 1798. "I am weary and go to rest" is not only one of the best of her poems, but one of the best pieces of religious verse in the German language. She died in Paderborn, Dec. 18, 1876.

Henty, George Alfred, a popular English novelist and writer for boys; born in Trumpington, Cambridgeshire, Dec. 8, 1832. He was editor of "Union Jack," a journal for boys, and was a special war correspondent of the London "Standard" in various quarters of the globe. A voluminous writer, among his works are: "The Young Franc-Tireurs," "Winning His Spurs," "Facing Death," "The Lion of St. Mark's," "In the Hands of the Cave Dwellers," "Lost Heir," and some 70 others. He died Nov. 16, 1902.

Henwoodite, a hydrated phosphate of alumina and copper, and thus related to turquoise. It is found in globular masses of a turquoise blue color, having a crystalline exterior, on a siliceous limonite at the West Phœnix mine, Cornwall, England. Its hardness is about 4.5, and density 2.67.

Hepar, in chemistry and pharmacy, hepar sulphuris, *Potassa sulphurata.* A mixture of tersulphide of potassium with sulphate of potassium. Obtained by heating together sulphate and carbonate of potassium in a crucible. It forms a brown liver-colored mass, soluble in water. It is used to prepare *Unguentum potassæ sulphuratæ,* ointment of sulphurated potash. It is used externally in the treatment of chronic skin diseases, also for chronic rheumatism. Sometimes called liver of sulphur.

Hepatica, a genus of hardy perennial plants belonging to the natural order *Ranunculaceæ,* closely related to anemone, and formerly included in that genus under the name *A. Hepatica. H. triloba* is the best known species, and has long been extremely popular in the flower garden on account of its flowering in early spring in great profusion; the flowers of the several varieties being also very brilliantly colored. The normal color of the species appears to be purple, but there are varieties with red, deep blue — of these there are single and double-flowered forms — and pure white flowers. Its roots are powerfully astringent, but have not the acrid qualities possessed by many of the *ranunculaceæ. H. angulosa* is the only other species known to cultivation; it is larger in all its parts; the flowers are pale blue. It is a native of Transylvania, and both species delight in partial shade rather than full exposure to the sun.

Hepatic Diseases, affections of the liver, divided by Dr. Murchison into painless and painful. The chief are cirrhosis, abscess, and cancer.

Hepatitis, inflammation of the liver.

Hepatization, conversion into a liver-like substance; applied to the lungs when gorged with effused matter, so that they are no longer pervious to the air, as found in acute pneumonia.

Hephæstion (hef-est'ē-on), a noble Macedonian of Pella, the friend of Alexander the Great. He accompanied the king in his Asiatic campaigns, and died in Ecbatana (325 or 324 B. C.) Alexander had his body conveyed to Babylon, and erected a costly monument to him.

Hephæstus, the god of fire and of smithying among the Greeks, is represented by Homer as lame, walking with the aid of a stick, and panting as he goes. There is also an element of the comic connected with him; his gait and ungainly figure provoke the laughter of the gods. On the other hand, he is himself given to practical jokes; he constructs a seat on which his mother sits down, but from which she is unable to rise. His mother was Hera, who (according to Homer) liked her lame child so little that she cast him far out from heaven. Another account of his fall from heaven is also given by Homer—that Zeus threw him out for siding with Hera against him. The story of the seat just mentioned is brought into connection with the former version of his fall; none but he could release Hera, nor would he help her till restored to his place in heaven. Mythologists interpret the fall of Hephæstus as the fall of lightning from the sky. Among the myths in which Hephæstus is concerned should be mentioned that of the manufacture of the first woman, Pandora (by whom all evil came into the world); the birth of Athene from the head of Zeus, when Hephæstus with an axe acted as midwife; and the birth of Erichthonios, who claimed Hephæstus for father, and from whom the Athenians counted themselves as descended. Hephæstus was by the Romans identified with their own fire god Vulcan.

HEPHÆSTUS.

Heptarchy (hep'tar-kë), the name sometimes applied to the seven kingdoms supposed to have been established by the Saxons in England. The term is completely misleading if it be taken to mean that there were neither more nor less than seven distinct kingdoms in the country down to the time of Egbert; but is permissible enough if taken to mean only that the chief kingdoms at various periods from the 5th to the 9th century were Wessex, Sussex, Kent, Essex, East Anglia, Mercia, and Northumbria.

Heptateuch (hep'ta-tūk), a word sometimes used for the first seven books of the Old Testament — formed on the analogy of Pentateuch and Hexateuch.

Heptoic-acids, in chemistry, $C_7H_{14}O_2$, or $C_6H_{13}\cdot CO\cdot OH$, acids belonging to the fatty series, having seven carbon atoms; 17 acids are possible; the only important one is the normal heptoic acid,. or œnanthylic acid. It is obtained by the oxidation of œnanthol, or normal heptyl alcohol. It can also be obtained by boiling normal hexyl cyanide with caustic potash; also by the oxidation of castor oil with nitric acid. It is a transparent, colorless oil, having an unpleasant smell. It boils at 223°. Heated with baryta it yields hexane C_6H_{14}. It forms crystalline salts. Its ethylic ether boils at 180°.

Heptoic-aldehyde, in chemistry, $C_7H_{14}\cdot O$, or $C_6H_{13}\cdot CO\cdot H$. Œnanthylic aldehyde, or œnanthol, is obtained by the dry distillation of castor oil. It is a stinking liquid, boiling at 155°.

Heptyl, in chemistry, C_7H_{15}. A monatomic fatty radical, containing seven carbon atoms.

Heptyl-alcohols, in chemistry, C_7H_{15}: OH, alcohols belonging to the fatty series, containing seven carbon atoms. Thirty-eight of these alcohols are theoretically possible, and 13 are known. The normal heptyl alcohol, $CH_3:(CH_2)_5\cdot CH_2OH$, is obtained by the action of nascent hydrogen, from sodium amalgam and water, on heptyl aldehyde (œnanthol), or by converting normal heptane into the chloride, and acting on this by silver acetate, and distilling the resulting acetate with caustic potash. It is a colorless, oily liquid, boiling at 177°.

Heptyl-chloride, in chemistry, $C_7H_{15}Cl$, a colorless liquid, which burns with a smoky green flame. Obtained by the action of phosphorus pentachloride on heptylic alcohol.

Hepworth, George Hughes, an American clergyman; born in Boston, Feb. 4, 1833. He was a Unitarian and later a Presbyterian minister, finally occupying an editorial position on the staff of the New York "Herald." He has published: "The Whip, Hoe, and Sword" (1864); "The

Criminal, the Crime, the Penalty" (1865); "Starboard and Port" (1876), record of a yacht cruise; a book entitled "! ! !"; "Rocks and Shoals"; "Brown Studies"; "Hiram Golf's Religion"; "They Met in Heaven"; etc. He died June 7, 1902.

Hera, an ancient Greek goddess, identified by the Romans with their Juno, the sister and wife of Zeus (Jupiter), and daughter of Kronos (Saturn) and Rhea. The poets represent Zeus as an unfaithful husband, and Hera as an obstinate and jealous wife, the result of which is frequent strife between them. She was worshiped in all Greece, but her principal seats were at Argos and at Samos. The companions of Hera were the Nymphs, Graces, and Hours. Iris was her particular servant. Among animals, the peacock, the goose, and the cuckoo were sacred to her. Her usual attribute is a royal diadem on her head. The festivals in her honor were called Heræa. The principal were those celebrated every fifth year at Argos, which city was considered to be especially under her protection.

HERA.

Heracleonites (her-ak'lē-on-īts), a sect of gnostics, founded in the 2d century by Heracleon, a follower of Valentinus. Heracleon taught that a monad was the original source of all things, that from the monad sprang two beings, and from these the æons emanated. He published a "Commentary on the Gospel of St. John," fragments of which have been preserved by Origen.

Heracles. See HERCULES.

Heracleum (her-ak'lē-um), in botany, cow-parsnip, hogweed, a genus of umbelliferous plants, family *Peucedanidæ*. It consists of large biennial or perennial herbs, having leaves with one to three pinnæ; compound many edged umbels, with few, many, or no bracts; and orbicular, obovate, or oblong compressed fruit. Fifty species are known. It is found in North Africa and North Asia. In the last-named place its root is skinned and eaten. *H. gummiferum* yields a gum resin.

Heraclian (her-āk-lē'an), an officer of the Emperor Honorius; who as governor of the province of Africa rendered good service during the invasion of Alaric. He became consul, but, revolting against Honorius, was defeated on invading Italy (A. D. 413), and slain soon after in Africa.

Heraclidæ (her-ak'lē-dē), the descendants of Hercules, who, after his death, 1209 B. C., were expelled from the Peloponnesus, and took refuge in Attica. The return of the Heraclidæ, or the Dorian Migration, 1104 B. C., forms a celebrated epoch in ancient chronology, as marking the transition from the heroic or fabulous ages to the period of authentic history.

Heraclitus (her-ä-klī'tus), a Greek philosopher, born in Ephesus, Asia Minor, and flourished about 500 B. C. He is said to have resigned the hereditary office of "king" of his native city in favor of his younger brother, and to have given himself up to a life of solitary contemplation. In the old traditions he was called, from his gloomy way of looking at things, "the weeping philosopher," in contrast to Democritus, "the laughing philosopher." He died at the age of 60.

Heraclius, a Roman emperor of the East, from 610 to 641; born in Cappadocia about A. D. 575. His father Heraclius, exarch of Africa, had gained great renown by his victories over the Persians, and after Phocas had ascended the throne by murdering his master, the Emperor Mauricius, was applied to by a powerful body of insurgents to declare war against the usurper and claim the throne for himself. After temporizing for a little he declined to claim the throne, but sent his son Heraclius from Carthage at the head of a powerful fleet. The moment the fleet appeared off Constantinople the insurgents within the city put their plans in execution and Phocas perished by an ignominious death. Heraclius the younger now ascended the throne, and though he possessed considerable talent, the Roman empire in the East was now tottering to its fall, and nothing he was able to do could save it. Before his death, Syria, Palestine, Mesopotamia, and Egypt had fallen under the dominion of the caliphs. He was permitted, however, to die in peace, and to transmit the succession to his son, who mounted the throne under the title of Constantine III.

Herald. The etymology of this word is uncertain. According to some authorities it comes from a primitive German word signifying a crier, others derive it from an old high German compound, which is found existing in proper names, *hariwalt* or *hariswalt*, from *hari*, an army, and *waltan*, to manage. The office of the herald as established in the Middle Ages was essentially a chivalric institution, and derived its importance from the customs of chivalry. Heralds began to appear about the 12th century, and assumed the functions which ultimately belonged to their office, gradually,

They appear at first to have been mere messengers employed to summon the men of arms. The office did not acquire its full importance till heralds began to be officially employed by princes. The functions of the herald were to carry messages of courtesy or defiance between sovereigns or persons of knightly rank, to superintend and register the results of trial by battle, tournaments, and other chivalric exercises, to record the valiant deeds of combatants, compute the slain after battle, proclaim war or peace, marshal processions and public ceremonials, and especially to regulate and determine all matters connected with the use of armorial bearings. The herald, after the office was fully constituted, was created with many ceremonies, and had to pass through various grades of protracted service before reaching the full dignity of a herald. According to Gerard Legh they were first courtiers or foot messengers, who wore their princes' colors "parted upright," that is, in two colors; they were knights but not nobles. After seven years' service they were made chevaliers of arms, and carried their sovereign's messages on horseback; on serving seven years more the knight-of-arms became a pursuivant and was qualified at once to be a herald. He was in fact ranked as holding the lowest grade of that office, of which there were three, king-at-arms, herald, and pursuivant. The pursuivant was invested with the tabard, or herald's coat; but had to wear it crosswise, the sleeves hanging one in front and one behind. When he became a herald the tabard was turned so that the sleeves hung over his arms. The creation both of herald and pursuivant was attended with a baptism with wine and water. The king-at-arms were crowned by the sovereign himself. They wore richer tabards, embroidered on velvet in place of satin, with gilt collars and coronets of 16 strawberry leaves. Heralds are now shorn of much of their importance. They are appointed in England by the earl marshal, whose office is hereditary. The Heralds' College, or College of Arms, founded by charter of Richard III. in 1483, consists of the three chief heralds; the six subordinate or provincial heralds of York, Lancaster, Chester, Windsor, Richmond, and Somerset; two heralds extraordinary — the Surrey herald and the Maltravers herald — together with the earl marshal (the Duke of Norfolk); registrar, and secretary; in all 14 persons. There are also four marshals or pursuivants, called blue-mantle, rouge-croix, rouge-dragon, and portcullis, who usually succeed to vacancies in the Heralds' College.

Herald Crab, a species of crab (*Huenia heraldica*), the carapace of which presents a fanciful resemblance to the shield and mantle figured by heraldic painters in depicting coat-armor.

Heraldry, properly the knowledge of the whole multifarious duties devolving on a herald; in the more restricted sense it is the science of armorial bearings. After occupying for ages the attention of the learned, and forming an important branch of a princely education, the study of heraldry fell, in later times, into neglect and disrepute, and was abandoned to coach-painters and undertakers, a degradation owing in part to the endless tissues of follies and mystifications that had been interwoven with it. The rules of heraldry differ somewhat in different countries, but the general principles are the same. In English heraldry, arms are divisible into three classes: Arms of state, of communities or corporations, and of persons and families. All these classes of arms are displayed on a shield or escutcheon. There is no prescribed form for the shield, but the shape usually adopted is that in the accompanying illustrations. The shields of maids and widows are in the form of a lozenge. The face of the shield, on which the arms are blazoned, is technically called the field.

To facilitate description, heralds divide this into nine parts, viz.: A, the dexter chief; B, middle chief; C, sinister chief; D, honor point; E, fess point; F, nombril or navel point; G, dexter base; H, middle base; and I, sinister base. Fields are diversified by tinctures, lines of division, and charges. Tinctures are composed of metals, colors, and furs. Metals are or (gold) and argent (silver). Colors are gules (red), azure (blue), sable (black), vert (green), and purpure (purple). The furs are ermine, vair, and potent, which have some variations. In drawings and engravings tinctures are designated by dots and lines. Thus, or is known by a shield filled with dots, argent by a plain shield, gules by vertical lines, azure by horizontal lines, etc. The field being often of a combination of colors, it is variously divided by lines. When the division is into two equal parts by a vertical line, it is said to be parted or party per pale; by a horizontal line, per fess; by a dexter diagonal line, per bend; by a sinister diagonal line, per bend sinister, etc.

All of these divisions are multiplied by the use of a variety of lines, the principal of which are called engrailed, invected, wavy, embattled, nebuly, raguly, indented, dancette, and dovetailed. A charge is any emblem or figure borne in the field, and the field thus blazoned is said to be charged. Charges are divided into honorable ordinaries, sub-ordinaries, and common charges. The honorable ordinaries, which are the principal charges in heraldry, are nine, viz.:

the chief, pale, bend, bend sinister, fees, bar, chevron, cross, and saltier. Modern criticism has rescued heraldry from the pedantries and follies of the heralds, and imparted to it a new interest as a valuable aid to historical investigations. Blazonry is an essential part of the science of arms. To blazon a coat is so to describe it that any one with an ordinary knowledge of heraldry will be able to depict it correctly. In the language of blazonry, all tautology must be avoided. The tincture of the field is first mentioned; the ordinary, if any, follows, unless it be a chief; then the charges between which the ordinary is placed. The charges on the ordinary follow, and lastly we have a canton or chief, and marks of cadency.

Besides the heraldic devices depicted on the shield there are the following borne external to it: the helmet, the mantling, the wreath, the crest, the motto and scroll, the supporters, and the coronet. The helmet, originally a piece of defensive armor, became in the course of time one of the usual accompaniments of the shield; and, placed over the arms, it came by its form to mark the rank of the wearer. The mantling is an embellishment of scroll-work flowing down on both sides of the shield, and originating in the cointoise, or scarf, wrapped round the body in the days of coat-armor. The scroll, placed over the crest or below the shield, contains a motto, bearing, in many cases, an allusion to the family name of arms. Supporters are figures or animals standing on each side of the escutcheon, and seeming to support it. They were in their origin purely ornamental devices, which only gradually acquired an heraldic character.

Herapathite, in chemistry, $C_{20}H_{24}N_2O_3I_2 \cdot SoH_2 + 5H_2O$, a salt obtained by dissolving sulphate of quinine in acetic acid, and then adding an alcoholic solution of iodine. It crystallizes in large tables, which have a beautiful green metallic luster, and polarize light like tourmaline.

Herat (her-ät′), a city of Afghanistan, and capital of an independent state; in a plain near the Herirood river, 360 miles W. by N. of Kabul. It is well fortified, and surrounded by a wet ditch, mound, and bastioned wall. It contains a number of caravanseries, public baths, reservoirs, and numerous mosques, besides a strong citadel. Herat is the emporium of the commerce carried on between Kabul and Bokhara, Hindustan, and Persia, and is a grand central mart for the products of India, China, Tartary, Afghanistan, and Persia. The local manufactures include carpets, leather, caps, cloaks, shoes, etc. This place has often been ravaged by various conquerors, disputing the empire of Asia. The position of Herat is one of the greatest possible importance, and has been well described as the "Gate of India"; for within the limits of the Heratee country all the great roads leading to India converge. By the Herat route alone could a formidable and well-equipped army march upon the Indian frontier from the N. W. regions. Pop. (1904) est. 50,000. See AFGHANISTAN.

Herault (ā-rō′), a river of France, rising in the Cevennes, department Gard, which in its course of 78 miles waters Ganges, St. Guilhem, Pézénas, and Bessan, after which it falls into the Mediterranean at the harbor of Agde. Also a maritime department in the S. of France, formerly comprised in Languedoc. It is bounded along its S. E. side by the Mediterranean. Area, 2,444 square miles. Its surface is mountainous in the N. and W., fine valleys, however, intervening; the coasts are low, and exhibit extensive lagoons and salt marshes. Climate, mild and genial, and generally healthy, with the exception of the swampy localities. Wine, olives, mulberries, fruits, drugs, and dyes are produced. Pop. (1906) 482,779.

Herbaceous Plants, perennial plants of which the stem perishes annually, while the roots remain permanent and send forth a new stem in the following season.

Herbal, originally a book containing an account of all known plants with their medicinal properties; now a book containing descriptions only of those plants which possess medicinal properties.

Herbarium, or **Hortus Siccus** ("dry garden"), a collection of specimens of dried plants, intended for the future study and examination of botanists. Specimens intended for the herbarium should be as perfect in all their parts as possible. They are laid between layers of blotting or botanical paper, and subjected to pressure to dry them. The pressure should be light at first, but increased as the process of drying goes on. The paper requires to be changed frequently — daily in the case of succulent specimens. Special methods have to be adopted in the case of very succulent specimens, such as orchids, etc.; only very slight pressure must be given; and subjecting them to constant uniform heat, as in hot sand, placing them in an oven, or suspending and turning them before the fire, enveloping them first, of course, in paper, indicate some of the modes of proceeding with such specimens. When dried they are mounted on paper, and, if they are to be of any scientific value, the generic and specific names of each should be attached, along with all other data bearing on its identity, such as habitat, etc. Care must be taken to preserve specimens from the ravages of moths and beetles by frequent

inspection, by the aid of camphor, and by the occasional application of a little corrosive sublimate. The specimens should be carefully placed in pigeon holes with close-fitting covers.

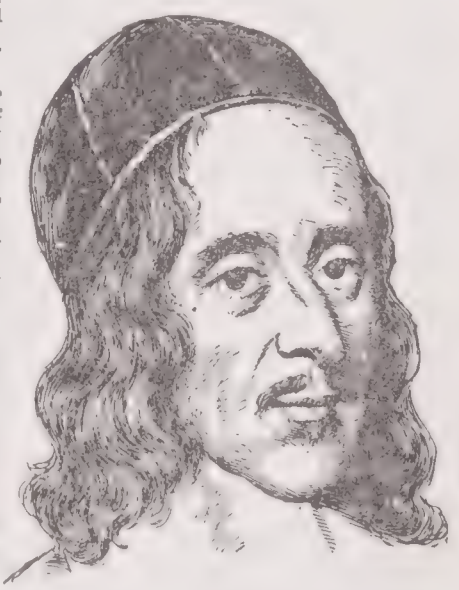
Herbart, Johann Friedrich (her'bärt), a German philosopher; born in Oldenburg, in 1776. He was Professor of Philosophy at the universities of Königsberg and Göttingen. Herbart developed peculiar opinions in opposition to most of the existing systems of philosophy, rejecting the method of psychology, aiming at a science of mind based on mathematics, and maintaining that philosophy is not a science or explanation of any one subject, but a certain method of treating any subject — a development and elaboration of notions or conceptions. His works include "Psychology as a Science," "Metaphysics and Mathematics," "Introduction to Philosophy," "Universal Metaphysics" and "Short Encyclopædia of Philosophy." He died in 1841.

Herbelot Barthélemy d', a French Orientalist; born in Paris in 1625; became (1692) Professor of Syriac in the Collége de France; died in 1695. His "Bibliothèque Orientale" was published after his death. It is a universal dictionary of all knowledge known to the Orient, and is principally based upon the Arabic work of Hajji Khalfa; though lacking in critical accuracy, it is full of important information for those who do not read Arabic and other Oriental tongues.

Herbert, the name of a famous British family. Herbert Fitz-Herbert was chamberlain and treasurer to King Henry I. In the reign of Henry V. Sir William Herbert of Raglan Castle, County Monmouth, received the honor of knighthood. His eldest son, a staunch adherent of the House of York, was created Earl of Pembroke by Edward IV. in 1468. His son became Earl of Huntingdon. The title of Earl of Pembroke was restored to the Herberts in 1551. The new earl was one of the most influential noblemen of his age, and one who took an active part in public affairs, both as a statesman and a soldier. By his wife, who was a sister of Catharine Parr (the last queen of Henry VIII.), he had a son Henry, second earl, to whose countess, Mary ("Sidney's sister, Pembroke's mother"), Sir Philip Sidney dedicated his "Arcadia." It has been attempted to identify Shakespeare's "W. H.," the "only begetter" of the "Sonnets," with the third earl, who succeeded in 1621.

Herbert, Edward, Lord Herbert of Cherbury, an English writer; born in 1581. He was educated at University College, Oxford. In 1609 he distinguished himself at the siege of Juliers under the Prince of Orange, and in 1614 served again in the Low Countries under the same leader. In 1618 he was ambassador to France, but was recalled in consequence of a quarrel with Constable Luynes, the favorite of Louis XIII. On the death of Luynes, however, he was sent back to France as resident ambassador. At Paris, in 1624, he printed his famous book, "Concerning Truth," with the object of asserting the sufficiency, universality, and perfection of natural religion. In 1625 he returned from France and was created an Irish peer, and in 1631 an English baron. He joined the Parliamentary party, but subsequently quitted it, and suffered in fortune in consequence. The character of Lord Herbert, as shown in his memoirs, was vain, punctilious, and quixotic, but open, generous, and brave. Another work of his was "The Religion of Races." Soon after his death was published his "Life and Reign of Henry VIII." He died in London, in 1648.

Herbert, George, an English poet, brother of Lord Herbert of Cherbury; born in 1593. He was educated at Trinity College, Cambridge. From 1619 till 1627 he was university orator. The death of James I. in 1625 put an end to his prospects of civil promotion, and in the same year he took orders, and became a prebendary in the diocese of Lincoln. In 1630 he took priest's orders, and was presented to the rectory of Bemerton, near Salisbury, in Wiltshire. His collection of religious poems, "The Temple," was published in 1631 and the "Jacula Prudentum," a collection of proverbs, in 1640. His poems bear the marks of an exceptionally fine nature, if not of genius, but they are marred by conceits and mannerisms. His chief prose work was "The Country Parson" (1652). He died in 1633.



GEORGE HERBERT.

Herbert, Henry William (pen name, FRANK FORESTER), an American author; born in London, England, April 7, 1807. He was graduated at Oxford, and came to the United States in 1830, rising to eminence as a writer and scholar of decided versatility. His works include: "Cromwell"; "Marmaduke Nyvil"; "The Puritans of New England"; "The Fronde"; "Sherwood Forest"; and other historical novels. His histories comprise "Captains of the Old World"; "Cavaliers of England";

"Captains of the Great Roman Republic"; etc. Over the pseudonym "Frank Forester" he published: "Field Sports of the United States and British Provinces"; "Frank Forester and his Friends"; "Manual for Young Sportsmen"; etc. He died in New York city, May 17, 1858.

Herbert, Hilary Abner, an American lawyer; born in Laurensville, S. C., March 12, 1834. He was educated in the universities of Alabama and Virginia, studied law and was admitted to the bar. He entered the Confederate service as captain, was promoted to the colonelcy of the 8th Alabama volunteers and was disabled at the battle of the Wilderness, May 6, 1864. He continued the practice of law at Greenville, Ala., till 1872, when he removed to Montgomery. He was elected to Congress in 1877, and was reëlected seven times. He was, in Marcn, 1893, appointed Secretary of the Navy by President Cleveland. In 1897 he began the practice of law in Washington.

Herbert, Michael Henry, an English diplomatist; born in England, June 25, 1857; entered the diplomatic service in 1877; went to Paris as attaché in 1879; soon after was made second secretary; was sent to Washington as charge d'affaires, where he remained a year; and was secretary of the British Legation at Washington in 1892–1893; at The Hague in 1893–1894; and at Constantinople in 1894–1897. He was transferred to Rome in the latter year, and to Paris in 1898; and on June 4, 1902, was appointed British ambassador to the United States to succeed the late Lord Pauncefote. His selection was greatly pleasing to the officials in Washington. He died Sept. 30, 1903.

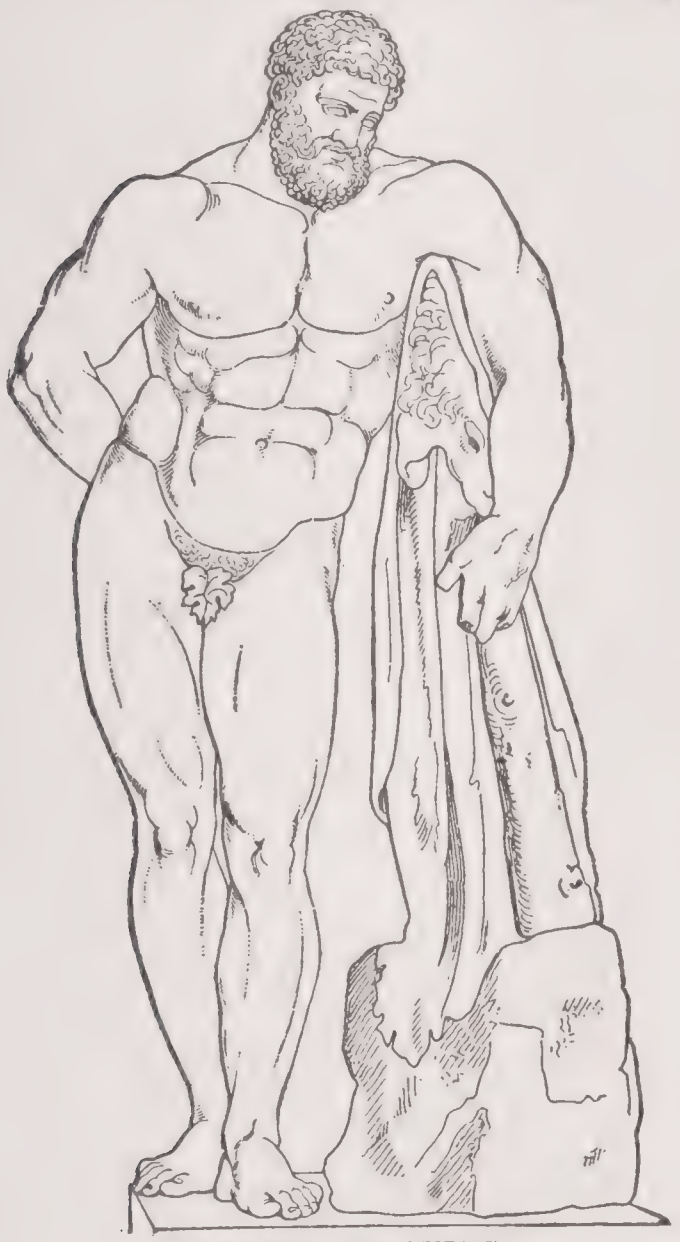
Herculaneum (her-kū-lā′nē-um), an ancient city about 5 miles from Naples, completely buried with Pompeii by lava and ashes during an eruption of Vesuvius in the reign of Titus, A. D. 79. The site had been long sought in vain, when in 1713 three statues were found in digging a well at the village of Portici. In 1738 the well was dug deeper, and traces of buildings were found. The theater was then discovered, but though the excavations were continued for many years it is now the only building to be seen underground, as the successive excavations were immediately filled up with rubbish from a new digging. A number of public buildings and private dwellings were laid bare, and many objects of great value discovered, such as statues, busts, beautiful mosaics, wall paintings, and charred papyrus manuscripts. One of the houses discovered contained a quantity of provisions, consisting of fruits, corn, oil, pease, lentils, pies, and hams. Few skeletons have been found either in Pompeii or Herculaneum, so that it is probable most of the inhabitants had time to save themselves by flight. Among the most interesting objects discovered here were the papyri, over 1,750 of which are now in the Naples Museum, but hardly a third have yet been unrolled, the process presenting great difficulties from the tendency of the MSS. to crumble. The knowledge of ancient art has, however, gained more by the discoveries made here than literature.

ATHENEA OF HERCULANEUM.

Herculano de Carvalho e Araujo, Alessandro (er-kö-lä′nö de kär-väl′yö ē ä-rou′-zhö), a Portuguese scholar; born in Lisbon, March 28, 1810. He early distinguished himself as a political reformer, editor, and poet of reform. He also wrote valuable histories and historical novels. "The Prophet's Voice" is the best of his poems. "Enrico" is a strongly original historical novel. The "History of Portugal" and "The Origin and Development of the Inquisition in Portugal" are his best efforts in history. He died near Santarem, Sept. 12, 1877.

Hercules (her′kū-lēz), or **Heracles,** the beloved son of Zeus by Alcmene, was intended by his father to be king of the Argives; but Hera, the jealous spouse of Zeus, by a trick caused Eurystheus to become king of Argos. Nor was her wrath satisfied with this; she made Hercules serve Eurystheus, by far the inferior man. And he enjoined hard adventures on Hercules, even sending him to Hades to fetch up the dog Cerberus. Thus Hercules was doomed to a life of trouble, and became the type among the Greeks not only of manly strength, but of manly endurance. Besides the labors imposed on him by Eurystheus, Hercules un-

dertook adventures on his own account, killing a sea monster that ravaged Troy, and destroying Troy when the mares promised him as reward for killing the monster were denied him. His love of horses also led him to kill Iphitus, though his guest. Finally, after death, he himself joined the banquet of the deathless gods, with Hebe as his wife; but his phantom, armed with



FARNESE HERCULES.

bow and arrow and gold baldric, with wild boars and lions wrought upon it, terrified the dead in Hades. Thus far according to Homer.

Hesiod adds four more labors, imposed by Eurystheus — the destruction of the Nemean lion, of the Lernæan hydra, fetching the oxen of the triple-bodied Geryones, and the golden apples of the Hesperides; and Hesiod includes among the voluntary exploits, freeing Prometheus from the eagle which tortured him. From later authors we hear of yet more labors, the number of which was first fixed at 12 by Pisander (who lived about 650 B. C., and wrote an epic poem on the adventures of Hercules), though this number was not regarded as a canon either of poetry or art. They are the destruction of the Erymanthian boar, and of the Stymphalian birds; the capture of the Cretan bull. of the stag of Ceryneia, and of the horses of Diomedes; the cleansing of the stables of Augeas; and obtaining the girdle of the queen of the Amazons. As to the manner of his death nothing is said by Homer, but in later times the story was, that, in the agonies caused by the poisoned robe of Nessus sent to him in all innocence as a love charm by his wife, Deianira, he threw himself onto a funeral pyre on Mount Œta, and was thence carried up to heaven.

In art, Hercules is represented as the type of manly strength, with muscular limbs, curly hair, and somewhat small head; a club and lion's skin are often added. The most notable statue is the so-called Farnese Hercules, found in the baths of Caracalla in 1599, and now in the museum at Naples. It is the work of the Athenian Glycon, but probably a copy of a work by Lysippus.

Hercules, Pillars of, a fanciful name given by the ancients to the two rocks forming the entrance of the Mediterranean at the Strait of Gibraltar. Their erection was ascribed by the Greeks to Hercules, on the occasion of his journey to the kingdom of Geryon. The pillars are not mentioned in Homer, though he speaks of Ulysses's passage out of the Mediterranean into the ocean and back, showing an apparent knowledge of the existence of the strait. The first author who mentions them is Pindar, who places them at Gades (Cadiz), and his opinion had many followers in later times. The most general opinion, however, identified them with Calpe (now Gibraltar), and Abyla (now Ceuta).

Hercynian Forest (her-sin′ē-an), the general designation of the entire wooded mountain ranges of Middle Germany, from the Rhine to the Carpathian Mountains. Different ancient writers apply the name sometimes to one of the constituent ranges, sometimes to another. Modern geographers, and more particularly geologists, apply the term Hercynian system to all the mountain chains between Westphalia and Moravia. These have for the most part a N. W. to S. E. strike, and are all older than the close of the Cretaceous period.

Herder, Johann Gottfried von (her′-der), a German author; born in 1744. From 1764 to 1769 he was an assistant teacher at the cathedral school of Riga, with which office that of a preacher was connected, and it was during this period that he published his "Fragments on German Literature." In Strasburg he became acquainted with Goethe, on whom he had a very decided influence. His "Fragments," "Critical Woods" and other productions had gained him a considerable reputation, and he was appointed in 1771 court preacher. In 1801 he was made president of the high consistory, a place before only given to noblemen. He was subsequently made a

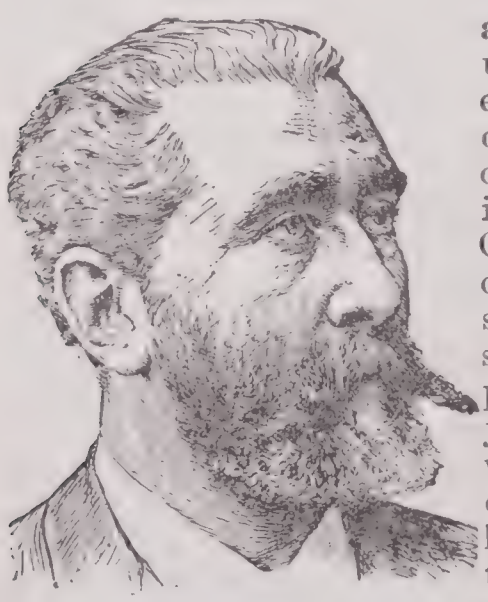
noble by the elector of Bavaria. His greatest work is his "Ideas on the Philosophy of the History of Man." He died in 1803.

Hérédia, José Maria de (ā-rā′dē-ä), a French poet; born in Cuba, Nov. 22, 1842. He went in boyhood to France, where he was

JOHANN VON HERDER.

educated, and where with short intervals he subsequently lived. He printed occasional poems, sonnets, etc., for private circulation, and though a Spaniard born he gradually came to be reckoned one of the most gifted and accomplished of French poets. He is now a naturalized French citizen. A collection, "The Trophies," published in 1894, deals largely with the Conquistadores. He was admitted to the French Academy in 1895. His fame rests principally upon a book of about 100 sonnets, each an independent poem. He died Oct. 3, 1905.

Hereditament (her-ed-it′a-ment), a legal term of which the authoritative definition is given as follows by Blackstone: "Hereditaments, then, to use the largest expression, are of two kinds, corporeal and **incorporeal. (1)** Corporeal hereditaments consist wholly of substantial and permanent objects, all of which may be comprehended under the general denomination of land only. (2) An incorporeal hereditament is a right issuing out of a thing corporate, whether real or personal, or concerning, or annexed to, or exercisable within, the same. It is not the thing corporate itself, which may consist in lands, houses, jewels, or the like; but something collateral thereto, as a rent issuing out of those lands or houses, or an office relating to those jewels. Incorporeal hereditaments are principally advowsons, tithes, commons, ways, offices, dignities, franchises, corodies or pensions, annuities, and rents."



JOSÉ M. HÉRÉDIA.

Heredity, the transmission from parent to offspring of physical and intellectual characters. This has been at all times believed in, but it is only in recent times that the conviction has, in the hands of Darwin, Spencer, Haeckel, and Wallace, been methodized so as to embody an important zoölogical doctrine. The modern view of evolution in biology rests upon the belief that acquired peculiarities, or differences which may arise between parent and offspring, can be transmitted with some probability of permanence, especially if the variation presented by the young is determined by external conditions, or if it is such as to adapt the possessor more thoroughly to the conditions under which it is placed. On the other hand, while variations may be thus permanently transmitted by heredity, yet this very tendency of the young to repeat the characters of the parent is also a check on variability, or the tendency of structure and attributes to change with the environment. There is, however, much dispute among biologists as to the transmissibility by inheritance of acquired characteristics.

Hereford, the county town of Herefordshire, England, 144 miles W. N. W. of London. Its noble cathedral was built between 1079 and 1535, and so exhibits every variety of style from Norman to Perpendicular. Measuring 342 feet by 146 across the transept, it has a central tower 165 feet high. It suffered much at Wyatt's hands after the fall of the W. tower in 1786, but has been judiciously restored by Cottingham (1841–1852), and Sir G. G. Scott (1856–1863). Special features are the elaborate metal-work screen, the shrine of St. Thomas de Cantilupe (1282), the organ (originally by Renatus Harris), and the "Mappa Mundi," or map of the world (1314), a fac-simile of which was published in 1872. Hereford, with Gloucester and Worcester, is one of the meeting-places of the "Three Choirs." Other edifices are the Doricshire hall (1817), in front of it a statue (1864) of Sir G. C. Lewis; the corn exchange (1858), the Episcopal palace (formed out of a Norman hall), the college of vicars choral (1474), the 14th century grammar school, the half-timbered "Old House," the guild hall, the butchers' guild hall, the Coningsby Hospital (1610), the free library (1876), etc. The Nelson column (1807) marks the site of the almost obliterated castle; and the White Cross, one mile out on the Hay road, commemorates

the Black Death of 1347. Nell Gwynne and Garrick were natives. A large trade is done in agricultural produce; and the rose-gardens of Hereford are famous. A bishopric from 676, the city was chartered by Henry III. It has stood many sieges from Stephen's time down to the Great Rebellion. Pop. (1901) 21,382.

Herefords (from the county of Herefordshire, England, where they were first reared), a breed of cattle having a dark red body with a white face and breast, and sometimes a line of white along the back. They have a thicker skin than the shorthorn, and long curly soft hair; the head is like that of a Devon, but larger, the muzzle coarser, and the throat more fleshy. Herefords are good grazing and working animals. They are very hardy, and excellent for the butcher, but are not useful as dairy animals.

Heresy, the English word "heresy" does not occur in the Old Testament; in the New it is found four times, and "heretic" once. In none of these has it the classic sense of choice or philosophical tenets or sects. In I Cor. xi: 15 it seems to mean parties, without implying that any of these held erroneous theological views. The Revised Version places "heresies" in the text and "factions" in the margin. In Gal. v: 20 it appears to have the same meaning, for it is coupled with "hatred, variance, emulations, strife, seditions" (Authorized Version), "enmities, strife, jealousies, wraths, factions, divisions" (Revised Version). The Revised Version puts "heresies" in the text and "parties" in the margin. In Acts xxiv: 4, it means difference in methods of worship. In II Peter ii: 1 it is unequivocally error in doctrine, and it is on this last passage alone that the modern ecclesiastical use of the word has been founded. In Acts v: 17, xv: 5, xxiv: 5, xxvi: 5, xxviii: 22, *hairesis* is translated "sect." In ecclesiology and in church and civil history, the sense is religious error, departure from what is held to be true doctrine. Heresy has always existed in the Church. For the efforts to extirpate it, see HERETIC. In Roman Catholic theology, a voluntary state of error and obstinate continuance therein on the part of a Christian touching a truth or truths revealed by God and proposed by the Church to the world. This is formal heresy, and this alone, whether merely mental or manifested exteriorly, incurs a spiritual penalty. The heresy is material when the error is persisted in and defended in good faith and through invincible ignorance. Objective heresy is the erroneous opinion itself, whether held in good faith or not.

Heretic, one who adopts, and probably propagates, religious views which the Church to which he belongs, or the Christian Church in general, deems erroneous, and imperiling the eternal salvation of anyone holding them. Certain causes have in every age and country produced heresy, and will forever continue to do so. Some minds are compelled by their constitution to think independently on religious and other subjects, and in consequence tend to adopt new views; they receive ill treatment, which confirms them, excites sympathy in others and in some cases leads the sympathizers to adopt the same tenets. Heresies began in the Apostolic age. There were, for instance, Hymeneus and Philetus, who said that the resurrection was already past (II Tim. ii: 17), and apparently the Nicolaitanes, though they are censured for hateful deeds rather than doctrines (Rev. ii: 6). In Mosheim's "Church History" there is a chapter under each century headed "History of Sects and Heresies," and in no case is the chapter left blank. In treating of opinions held by heretics, it should be remembered that the statements of the accusers are *ex parte*, and that there are not materials for an impartial judgment, unless some book or document penned by the other side is obtainable. The Scripture direction for dealing ecclesiastically with heresies is given in Titus iii: 10: "A man that is an heretick after the first and second admonition reject." When the Church gained an influence over the civil power, it induced the latter to superadd civil to the ecclesiastical penalties for heresy. Those who differed from the opinions of the imperial house received many kinds of ill-usage, but it was not till A. D. 382 that a law of Theodosius I., directed against the Manichæans, authorized capital punishment for heresy. This law led to the execution at Treves, in A. D. 385, of Priscillian, Bishop of Avila; he is believed to have been the first person put to death by a Christian government for heresy. Many disapproved of the cruelty, but ultimately the bad precedent was followed. The oppression of the "heretics" made many of them side with the Mohammedans during the conflict of the latter with the orthodox Christians.

In mediæval times it was supposed that the proper method of dealing with a heretic was to burn him alive, and accordingly there was a writ "De hæretico comburendo" (About burning a heretic), regarding which Blackstone says that it "is thought by some to be as ancient as the common law itself." The conviction of heresy by the common law was, however, by the archbishop in a provincial synod, and the delinquent was handed over to the civil power. If the writ "De hæretico comburendo" was issued, it was by the special direction of the king in council, with whom also the power

rested of refusing to put the writ in force. During that part of the Reformation struggle in England in which the government was Roman Catholic, a heretic specially meant a Protestant; but by an act of Henry VIII. departure from the tenets of the Church of Rome was declared not to be heresy; an act of Elizabeth in name swept away the penal statutes against heretics, leaving them to be dealt with by ecclesiastical courts; but it was not till 1676 that an act of Charles II. actually removed the writ from the statute-book.

Hereward (her'e-), commonly called HEREWARD THE WAKE, an English yeoman or squire who held the Isle of Ely against William the Conqueror in 1070–1071. When William had succeeded in encompassing the English patriots and penetrating to their camp of refuge, Hereward, scorning to yield, cut his way through to the fastnesses of the swampy fens N.

Hergest, Red Book of, the name usually given to a great manuscript, the chief repository of Welsh literature, now preserved in the library of Jesus College, Oxford. It owes its name to Hergest Court, a seat of the Vaughans, for whom probably it was originally compiled. It is a folio volume of 360 vellum leaves written in double columns, from the beginning of the 14th to the middle of the 15th century.

Heribeia (-bē'yä), the wife of Astræus, and mother of the stars.

Heriot, or **Hariot,** in English law, a fine, such as the best beast, payable to the lord of the fee on the decease of the tenant. It is always a personal chattel, and is no charge on the lands, but merely on the goods and chattels. Heriots were originally, as the word means, arms, horses, and habiliments of war.

Heriot, George, a Scotch philanthropist; born in Scotland in 1563. He followed his father's profession, and was admitted a member of the Incorporation of Goldsmiths in 1588. In 1597 he was appointed goldsmith to the queen by James VI., and on the accession of the latter to the English crown followed the court to England. He left nearly the whole of his fortune to found a hospital in Edinburgh for the maintenance and education of poor fatherless boys, freemen's sons, of the town. The present magnificent structure known as Heriot's Hospital was built between 1628 and 1659. He died in London, England, in February, 1623.

Heristal (hā'ris-täl), or **Herstal** (hers'-),an industrial town of Belgium, on the Meuse, immediately N. E. of Liege, of which it is virtually a suburb. It is mostly inhabited by workmen, who find employment in the coal mines and the iron and steel works. Ruins still exist of the castle of Heristal, the birthplace of Pepin, the mayor of the place; and his great-grandson Charlemagne frequently resided here.

Heritage, in the Old Testament, the taking of anything capable of being possessed; a possession. Used of a field or fields (Jer. xii: 15), of the whole land of Canaan looked on as the special possession of Jehovah (Deut. iv: 20, ix: 26, 29; Ps. xxviii: 9), or the Israelites as His peculiar people (Joel iii: 2); also a gift bestowed by Him (Ps. cxxvii: 3). In the New Testament, Greek *klēroi,* literally = those assigned by lot. The flock placed under one's pastoral charge.

Herkimer, Fort, a fort built near the site of the present town of Herkimer, N. Y., during the Old French or Seven Years' War, and known during the Revolution as Fort Dayton.

Herkimer, Nicholas, an American military officer; born about 1715 of German parents. At the age of 30 he was lieutenant of militia, and was in command at Fort Herkimer, N. Y., when the Indians attacked it in 1758. He later became colonel and Brigadier-General of the New York militia. He joined the patriots of the Revolutionary War, and, owing to his popularity and force, was a powerful element in determining the success of the Revolution in his own State. His most noteworthy feat was the relief of Fort Schuyler when invested by Colonel St. Leger after the battle of Ticonderoga. The British troops heard of Herkimer's approach and surprised him while on the march. The militia were outnumbered and at first driven back, but Herkimer, though severely wounded, rallied his men, and ultimately drove off the whole besieging force. Ten days later he died from his wounds. In 1777 Congress ordered a monument to his memory, but it was not till 1882 that it was finally erected by joint appropriations from Congress, the New York Legislature, and private subscriptions. It is an obelisk 85 feet high, faced with bronze memorial tablets. Herkimer county was also named from General Herkimer. He died in Danube, N. Y., Aug. 16, 1777.

Herkomer, Hubert, an English painter; born in Waal, Bavaria, May 26, 1849. At an early age he settled with his parents in the United States and subsequently in England. He joined the Institute of Painters in Water Colors in 1871. His oil picture, "After the Toil of Day," in the Academy exhibition of 1873, was followed by his "Last Muster," which gained him the "grand medal of honor" at the Paris Exhibition of 1878. He was in 1879 elected an A. R. A. After 1880 he devoted much time to portraiture, and his portrait of Miss Grant is one of his many successes in that branch of art. He founded the Herko-

mer School of Art at Bushey in 1883; was elected a Royal Academician in 1890; was Slade Professor of Fine Arts at Oxford in 1885–1895; and was elected an Associate of the French Academy of Fine Art in 1895.

Hermæan Gulf. See SMYRNA, GULF OF.

Herman, Henry, an English novelist and playwright; born about 1850. He was collaborator with Henry Arthur Jones in the popular melodrama "The Silver King" (1882), and with W. G. Wills wrote "Claudian," a classic drama, both of which were features of Wilson Barrett's repertoire for many seasons. His other plays include: "Jeanne Dubarry" (1875), and "Slight Mistakes" (1876). As a writer of fiction he will be best remembered for "A Leading Lady," "Hearts of Gold and Hearts of Steel," and other stories; and "One Traveler Returns" and "He Fell Among Thieves," written with D. C. Murray. He died in London, Sept. 25, 1894.

Hermandad (er-män-da*th'*), **The** (Spanish, "brotherhood"), an organization which had its rise in an association of the principal cities of Castile against the nobles who in 1282, under Prince Sancho, rose against Alfonso X. When Sancho succeeded to the throne (1295) the league was more firmly organized throughout Castile and Leon, with the express object of resisting the tyranny and exactions of the crown-vassals and nobles. Ferdinand and Isabella, in order to curb the power of their feudatories, first favored the association and ultimately (in 1485) gave it a legal status under the name of the Hermandad. It now constituted a confederation of the entire burgher class for police and judicial purposes, with local courts and an annual meeting of deputies from all the cities; and the sovereigns, adopting its members as a standing force to counterbalance the followers of the feudal lords, put themselves at the head of the association, placed it at the service of the city magistrates, and employed it both in quelling disturbances and in seizing confiscated properties. The introduction of a regular standing army enabled the crown to free itself from this dependence on the towns; and with the decay of the Hermandad disappeared the last vestige of popular freedom.

Hermangarde, the name of several princesses during the Middle Ages: (1) The second wife of Charlemagne, daughter of Desiderius, king of the Lombards, who was drowned in 771, after being married a year. (2) The first wife of Louis le Debonnaire, or queen of Provence.

Hermann. See ARMINIUS.

Hermann, Alexander (her'män), a celebrated conjurer; born in Paris, France, Feb. 10, 1844. His father was a physician who amused himself by tricks of sleight-of-hand. He had a son, Carl, who learned the art and was a professional before he was 21 years of age. From this brother Alexander took his first lessons in sleight-of-hand and together the two traveled in Europe and made a name. They came to the United States in 1867 and met with great success. Carl returned to Europe after a time, but Alexander remained and became a citizen of the United States. He made a tour of the world and had few equals in his profession. He had a beautiful home in which he took great pride and in which he dispensed generous hospitality. His charming wife accompanied him on his professional travels and assisted him in the clever illusions which so delighted his audiences. He died near Great Valley, N. Y., Dec. 17, 1896.

Hermann, Johann Gottfried Jakob (her'män), a German classical scholar; born in Leipsic, Nov. 28, 1772. He studied there and at Jena, and was made in 1798 extraordinary Professor of Philosophy at Leipsic; in 1803, ordinary Professor of Eloquence; and in addition, in 1809, Professor of Poetry. He wrote: "Manual of Versification" (1798), and several Latin treatises on the same subject, among them "Epitome of Versification" (1818, 4th edition 1869); "On the Emendation of the Method of Greek Grammar" (1801); and published numerous excellent editions of the ancient classics. His power of dealing with chronological, topographical, and personal questions is shown in his "Minor Works" (8 vols. 1827–1877), which also contain some poems breathing the spirit of Roman poetry. He died in Leipsic, Dec. 31, 1848.

Hermannstadt (her'män-stät), a town of Hungary, formerly capital of Transylvania, 370 miles S. E. of Pest. It consists of an upper and a lower town, the walls, towers, and bastions formerly surrounding which have only recently been demolished. Hermannstadt is the seat of a Greek archbishop and of a "Saxon" university. The fine Bruckenthal palace contains a picture-gallery, numismatic, antiquarian, and mineral collections, and a library of 30,000 volumes. Tanning, wax-bleaching, and the making of cloth, paper, candles, sugar, and hats are carried on. Hermannstadt was originally the seat of a German colony, founded in the reign of Gesa II. (1141–1161), and was at first called Villa Hermanni. It endured several sieges from the Turks (1438 and 1442), as well as one from the followers of John Zapolya (1526). It also suffered at the hands of Gabriel Bathori in 1610, and again from both combatants during the Russo-Hungarian War of 1849. Pop. (1900) 29,577.

Hermaphrodite, in zoölogy, an animal having combined in itself the characteristics

of the two sexes, and capable of propagating its kind without the intervention of any other individual of the same species. Occasionally human beings are born combining some characteristics of the two sexes, but every one of these is essentially male or female. Some of the inferior animals, though fewer than was once supposed, really combine the characters of the two opposite sexes, to such an extent as to be able to propagate their own kind. But as Sprengel, Knight, and Kolreuter suspected, and Darwin proved, in the case of all hermaphrodites, two individuals either occasionally or habitually concur in the reproduction of their kind. In botany, possessing both stamens and pistils within the same floral envelope; bisexual. This is the rule rather than the exception among plants.

Hermaphroditus (hur-maf-rō-dī'tus), the son of Venus and Mercury (called so after their Greek names), whose beauty so won the affections of Salmacis that the gods granted her wish to be incorporated with him, in one body.

Hermas, one of the so-called apostolic fathers, generally supposed to be the person mentioned by that name in Rom. xvi: 14, though others maintain that he lived much later. He is known as the author of a work entitled the "Shepherd," circulated at Rome early in the 2d century, and for which a place in the canon was even claimed. Only a few fragments exist of the Greek original, but the Latin translation, made at a very early period, appears to be complete.

Hermes (called by the Romans MERCURIUS, and identified with their own god of that name), the son of Zeus and Maia, the daughter of Atlas. According to the legend Arcadia was his birthplace. Four hours after his birth he left his cradle and invented the lyre, which he made by killing a tortoise, and stringing the shell with three or seven strings. He then sang to it the loves of Zeus and his mother Maia. Having concealed the lyre in his cradle, he began to seek for food, for which purpose he went in the evening to Pieria, and stole 50 oxen of the sacred herd of the gods, which he drove backward and forward to confound their tracks; then, going backward himself, he drove them backward also; and after having killed two of them near the river Alpheus, roasted them by a fire procured by rubbing two sticks together, and sacrificed a part to the gods. He concealed the remainder in a cavern. He also carefully destroyed all traces of them. The next morning Apollo missed his oxen, and went in search of them, but he could discover no traces of them till an old man of Pylos told him that he had seen a boy driving a herd of oxen in a very strange manner. Apollo now discovered by his prophetic art that Hermes was the thief. He hastened to Maia, and accused the infant, who pretended to be asleep, and, not terrified by the threat of the god that he would hurl him into Tartarus, steadily maintained his innocence. Apollo, not deceived by the crafty child, carried his complaint to the king of gods. Hermes lied even to him. But Zeus penetrated the artifice of the boy and perceived him to be the offender; yet he was not angry with him, but smiling good-naturedly at his cunning, ordered him to show the place where the oxen were concealed. To secure him Apollo bound his hands, but his chains fell off, and the cattle appeared bound together by twos. Hermes then began to play on his newly-invented lyre, at which Apollo was so much enraptured that he begged the instrument of the inventor, learned of him how to play on it, and gave him a whip to drive the herds thenceforth belonging to both in common. Apollo was still more astonished when the ingenious god also gave the Pandean pipe its tones. They then concluded a contract with each other: Hermes promised never to steal Apollo's lyre or bow, and never to approach his dwelling; the latter gave him in return the golden wand of peace, the caduceus. The ancients represent Hermes as the herald and messenger of the gods. He conducts the souls of the departed to the lower world, whence he is called Psychopompos, and is therefore the herald of Pluto and the executor of his commands. His magic wand had the power to close the eyes of mortals, to cause dreams, and wake the slumbering. The qualities requisite for a herald he possessed in the highest perfection and bestowed them on others — grace, dignity, and insinuating manners.

Hermes, Georg (her'mes), a German theologian; born in Dreierwalde, Westphalia, Prussia, April 22, 1775. He studied theology at the University of Münster; became teacher in the gymnasium of that city, and in 1807 Professor of Dogmatic Theology in the university. When the Prussian government established the University of Bonn, Hermes was appointed to the chair of Catholic theology (1820). Here he distinguished himself by an ingenious effort to base the doctrines of the Church on Kant's system of philosophy (see HERMESIANISM). He died in Bonn, Prussia, May 26, 1831.

Hermes Trismegistus (tris-me-jis'tus), a supposed Egyptian priest and philosopher, the friend and counselor of Osiris, and the first lawgiver and founder of religious ceremonies in Egypt. He taught the Egyptians to cultivate the olive and measure land; the science of hieroglyphics; and to him are also attributed all the mystic pursuits that afterward made the Alexandrian school so famous. The works extant under the name

of Hermes are: "Poemander, on the Power and Wisdom of God"; "Asclepius, a Dialogue on the Deity, Mankind, and the World"; and some others supposed to be of less antiquity than these, and all alike regarded as supposititious. Their value, however, will be found very great in any attempt to determine the history of philosophy.

Hermesianism, the method of religious inquiry taught by GEORG HERMES (*q. v.*). Hermes combined with Roman Catholicism a strong tendency toward philosophy. He was of opinion that reason must first be exercised in establishing a Divine revelation and the claims of the Church of Rome infallibly to interpret its teaching. Reason then itself required an implicit acceptance of all the doctrines of the Church. These views he published in 1819 in an "Introduction to Christian-Catholic Theology." His old students and other admirers adopted his method, with the result that they tended to move, not toward, but away from the Church, in consequence of which the Pope, Sept. 26, 1835, issued a brief against Hermes' work, which was held to be of infidel tendency. A vehement controversy on the subject sprung up in Germany, the Prussian government, offended by the way the brief was carried out, coming into collision with the Court of Rome.

Hermetic Art, another name for ALCHEMY (*q. v.*).

Hermetic Sealing, the term used to denote a very old process in which a glass vessel, such as a tube or flask, has its neck so fused together that no part of the contained matter can escape, and nothing foreign can get in.

Hermione (-mī′ō-nē), in Greek mythology, the daughter of Menelaus and Helen, married first to Pyrrhus, son of Achilles, and afterward to Orestes.

Hermit, a name given in the early ages, and still more in the later church, to a solitary ascetic, who, with a view to more complete freedom from the cares, temptations, and business of the world, took up his abode in a natural cavern or a rudely-formed hut in a desert, forest, mountain, or other solitary place. In the first centuries the names of eremite and anchorite were indiscriminately applied to these solitaries; but, the word *eremita* having been adopted into Latin, "hermit" is more commonly used in the modern languages which are derived from that tongue. Hermits began to appear in the Christian Church in the 3d century. The advocates of ASCETICISM (*q. v.*) were the first to set the example of retiring from cities to rural districts and villages. But the hermits went further, and sought to withdraw altogether from mankind, that they might give themselves up to a life of solitary but holy contemplation.

The earliest hermit is said to have been Paul of the Thebiad (Egypt), who during the Decian persecution fled for safety to the desert (250); there he lived for the rest of his life, dying, 113 years old, about 342. The fame of his sanctity quickly incited others to imitate his mode of life. The most famous among these successors was St. Anthony (see ANTHONY, ST.). At the time of his death hermit cells existed in considerable numbers in the deserts of Egypt, Syria, and Palestine. The fame of the hermits' sanctity drew many to visit them, partly out of curiosity, partly to enjoy pious converse with them, or to get religious advice from them, partly also in the belief that diseases, particularly mental diseases, were cured by their blessing. Sometimes they returned for a short time to the midst of their fellow-men to deliver warnings, instruction, or encouragement, and were received as if they had been inspired prophets or angels from heaven.

The STYLITES (*q. v.*) or pillar-hermits, who spent their lives on the tops of columns, and similar eccentric beings, were a base caricature of the true hermit, men in whom the good spirit of asceticism had become perverted by exaggerated fancy or pride or passion. But the number of hermits gradually diminished as the cœnobite life of convents grew into fashion. Indeed the institution at no time secured the same footing in the Western Church that it did in the Eastern. Partial revivals of the practice continued to be made, however, during several centuries. The name hermit was in still later ages applied to those eccentric individuals who separated themselves from their fellow-men to live in caves or solitary huts, not from any religious motives, but from a morbid aversion to human society or an inordinate love of solitude. See MONACHISM.

Hermitage, one of the finest French wines, produced along the Rhone between Valence and Valière, in the former Dauphiny. It is of two kinds, red and white; the former is preferred.

Hermit Birds, the name given by Swainson and others to *Monassa,* a genus of *halcyonidæ,* having short wings and long broad tails. They often rise up perpendicularly in the air, make a swoop, and return to their former station. Habitat, Brazil. Also the genus *Phaëthornis* placed by Mr. Gould under the *Trochilidæ.* They build their nests at the extremity of leaves.

Hermit Crab, *Pagurus bernhardus,* or any similar species; called also the soldier crab. Hermit crabs, *Paguridæ,* a family of *Anomoura,* meaning Irregular-tailed Crustaceans. The name hermit crabs is given because each individual of the family, having but a soft abdomen, constituting a

fleshy mass vulnerable to the last degree, seeks out an abandoned univalve shell of suitable size, which may be at once a house and a fortification. Into the hollow spire of this he inserts his tail, guarding the aperture by means of his claws, which are very far from soft, and by means of which he draws his hermitage along. When, as he increases in size, he feels himself cramped for room, he deserts the old shell, and takes possession of a larger one.

Hermit Moths, the name given by Swainson to his lepidopterous family *Cryptophasidæ*, which he makes a tribe of the *Bombycides*.

Hermit Nation, The, Japan, in allusion to the exclusive policy of its people that for so many years closed it to the influences of Western civilization. Korea has also received the same title.

Hermogenians, an obscure, semi-Christian sect, followers of Hermogenes, who lived toward the end of the 2d century. Having tendencies to the gnosticism which then flourished, he believed matter to be the root of all evil, yet that from it was formed everything in the world, the human soul not excepted.

Hermon, Mount (now Jebel-es-Sheikh), the culminating point, 9,150 feet high, of the Anti-Libanus range. See LEBANON.

Hermopolis (-mop′ō-lis) **Magna,** an ancient town of Egypt, on the Nile, on the border of the Thebaid, and near the frontier line of Upper and Middle Egypt. Thanks to its position, Hermopolis grew to be a place of great importance, ranking next after Thebes. It had a celebrated temple sacred to Thoth, the ibis-headed god of letters, of which the portico alone is all that now remains. On the opposite or right bank of the Nile was Antinoöpolis, where the dead of Hermopolis were taken for burial. The modern name of Hermopolis is Ashmun or Eshmoon.

Hermosillo (her-mō-sēl′yō), a capital of the Mexican State of Sonora, in a fertile plain on the Rio Sonora, 50 miles N. of Guaymas. It has a mint and other government buildings, a bank of issue, sawmills, distilleries, and shoe and furniture factories, and a large export trade in wheat and wine. Pop. (1900) 17,618.

Hermus, a river of Asia Minor, flowing through the plain of Sardis, and falling into the Gulf of Smyrna.

Hernandia, a genus of large East Indian trees, forming the natural order *Hernandiaceæ*. They have alternate entire leaves and flowers arranged in axillary or terminal spikes or corymbs. *H. Sonora*, or Jack-in-the-box, is so called from the noise made by the wind whistling through its persistent involucels. The fibrous roots chewed and applied to wounds caused by the Macassar poison form an effectual cure, and the juice of the leaves is a powerful depilatory. The wood is light, that of *H. guianensis* takes fire so readily from a flint and steel that it is used in the same way as amadou.

Herndon, William Henry, an American lawyer; born in Greensburg, Ky., Dec. 28, 1818. In 1843 he formed a law partnership with Abraham Lincoln, which continued formally till the latter's death. He wrote the well-known "Life of Abraham Lincoln" (1889). He died near Springfield, Ill., March 18, 1891.

Herne the Hunter, a figure in popular tradition, long supposed to range at midnight around an ancient oak in Windsor Forest, England. He is referred to in Shakespeare's "Merry Wives of Windsor," and Herne's Oak continued to be an object of interest till it was blown down Aug. 31, 1863. The Queen planted a young oak on the spot where the patriarch had stood, as was supposed, for 650 years.

Hernia, the protrusion of some portion of the intestinal canal, or, in a more general sense, of any organ or part of an organ, from its natural place. It may arise from over-exertion, from a blow, etc. There are many varieties of hernia, as, the diaphragmatic, the enterovaginal, the mesenteric, the mesocolic, omental, perineal, the femoral, etc.; the most common of all is the inguinal, occurring in the groin. It may be direct or internal and oblique or external. When a hernia cannot be reduced, and, above all, when it becomes strangulated, it is apt to terminate in gangrene and death.

Hero (hē′rō), a priestess of Aphrodite, who loved and was beloved by a beautiful youth named Leander, whose home was at Abydos, on the opposite shore of the Hellespont. Hero's position as a priestess, and the will of her parents, were obstacles to their union, but Leander every night swam across the Hellespont to visit his beloved, directing his course by a lamp that burned on the top of a tower on the seashore. But one tempestuous night the light was extinguished, and Leander was drowned. Hero, when she saw his dead body washed ashore at daybreak, threw herself down from the tower into the sea and perished. A poem on this theme has come down to us under the name of Musæus; the romantic story is alluded to by Ovid, Vergil, and Statius; and in modern times Marlowe, Schiller, and Leigh Hunt have retold it in verse, while Grillparzer has made it the subject of a drama.

Hero of Alexandria, a great mathematician and natural philosopher; a pupil of Ctesibius; flourished about 100 or 150 B. C.

He seems to have invented a great number of machines and automata, among which are HERO'S FOUNTAIN (*q. v.*); a steam engine on the same principle as Barker's mill; a double forcing-pump used for a fire-engine, etc. Among his works which have come down to us the most notable is on pneumatics.

Hero's Fountain, a pneumatic apparatus, through which a jet of water is supported by condensed air.

Hero Children, Tylor's name for those children, remarkable in mythology, whom Cox, following Grimm, calls fatal children. Legend relates that they were exposed, suckled by wild beasts, brought up by herdsmen, and, when they came to man's estate, became national heroes. In many cases they unconsciously fulfilled the warnings of some oracle by destroying their parents. Sometimes, as with Remus and Romulus, one parent is supposed to have been divine; or, the birth to have been attended with portents, as in the case of Cyrus. Many instances occur in Aryan mythology and folklore, and even the savage Yuracarés, of Brazil, have a divine hero who was suckled by a jaguar.

Herod, called THE GREAT, from his power and talents, King of the Jews; was a native of Ascalon, in Judea, where he was born 71, or according to others, about 61 B. C.; was the second son of Antipater the Idumean, who, being made procurator of Judea by Julius Cæsar, appointed him to the government of Galilee. He at first embraced the party of Brutus and Cassius, but after their death reconciled himself to Antony, by whose interest he was first named Tetrarch, and afterward King of Judea. After the battle of Actium he so successfully paid his court to the victor that Augustus confirmed him in his kingdom; and on all occasions his abilities as a politician and commander were conspicuous; but his passions were fierce and ungovernable. Though married to the celebrated Mariamne, a princess of the Asmonean family, her brother Aristobulus and grandfather Hyrcanus fell victims to his jealousy of the ancient pretensions of their race. His very love of Mariamne herself, mingled as it was with the most fearful jealousy, terminated in her execution; and his repentance and keen remorse at her death only exasperated him to further outrages against her surviving relations, her mother, Alexandra, and many more falling victims to his savage cruelty. His own sons by Mariamne, Alexander and Aristobulus, whose indignation at the treatment of their mother seems to have led them into some intrigues against his authority, were also sacrificed in his anger; and their deaths crowned the domestic barbarity of Herod. It was the latter event which induced Augustus to observe that it was better to be Herod's hog than his son. He rebuilt the temple at Jerusalem with great magnificence, and erected a stately theater and amphitheater in that city, in which he celebrated games in honor of Augustus, to the great displeasure of the more zealous of the Jews. He also rebuilt Samaria, which he called Sebaste, and adorned it with very sumptuous edifices. He likewise for his security constructed many strong fortresses throughout Judea, the principal of which he termed Cæsarea, after the emperor. On his palace near the temple of Jerusalem he lavished the most costly materials, and his residence of Herodium, at some distance from the capital, by the beauty of its situation drew around it the population of a great city. Such, indeed, was his magnificence that Augustus said his soul was too great for his kingdom. The birth of Jesus Christ is said to have taken place in the last year of the reign of Herod, viz., 4 B. C., the true year of Christ's birth being four years earlier than that adopted as the Christian era. This year was also signalized by the massacre of the children of Bethlehem. Herod was attacked by a languishing and loathsome disease, and the paroxysms of pain he suffered served to increase the natural ferocity of his nature. According to Josephus, he planned a scene of posthumous cruelty, which could have been conceived only by the hardest and most depraved heart. Having summoned the chief persons among the Jews to Jericho, he caused them to be shut up in the circus, and gave strict orders to his sister, Salome, to have them massacred at his death, that every great family might weep for him; which savage order was not executed. Herod was the first who shook the foundation of the Jewish government, by dissolving the national council, and appointing the high priests, and removing them at pleasure, without regard to the laws of succession. His policy, ability, and influence with Augustus, however, gave a great temporary splendor to the Jewish nation.

Herod Agrippa I., son of Aristobulus by Berenice, daughter of Herod the Great. From his attachment to Caligula he was imprisoned by Tiberius, but on the accession of Caligula (A. D. 37) he received the government of part of Palestine, and latterly all the dominions of Herod the Great. To please the Jews, with whom his rule was very popular, he caused St. James to be put to death, and imprisoned St. Peter. He died in the circumstances related in Acts xii., in A. D. 44.

Herod Agrippa II., a Jewish prince; son of Herod Agrippa I.; born about A. D. 27. On his father's death, he being too young to govern, Judea was reduced to a Roman province. He subsequently received the

kingdom of Chalcis, and obtained the superintendency of the temple at Jerusalem, where, with his sister, Berenice, he heard the defense of Paul before Festus. Being driven from Jerusalem by the revolt of the Jews he joined Cestius, and later on Vespasian, and during the siege of Jerusalem was very serviceable to Titus. After its reduction (A. D. 70) he and Berenice returned to Rome. He is supposed to have died there, A. D. 94.

Herod Antipas, son of Herod the Great by his fifth wife, Cleopatra, was appointed Tetrarch of Galilee on his death (4 B. C.). This was the Herod who put to death St. John the Baptist, in compliment to his wife Herodias in revenge for his reproaches of their incestuous union. Having visited Rome he was accused of having been concerned in the conspiracy of Sejanus, and was stripped of his dominion, and sent (A. D. 39) with his wife into exile at Lugdunum (Lyons), or, as some say, to Spain, where he died.

Herodes Atticus, Tiberius Claudius (from Marathon, in Greece, his birthplace, frequently called MARATHONIUS), was said to be descended from Cecrops, and distinguished for his wealth and brilliant accomplishments. He was born in the reign of Hadrian, and held several public offices under the Antonines. In A. D. 143 he was appointed eponymos of Athens, and died, probably, after the year 180. The ruins of an odeum or building for musical performances at Athens, which Pausanias preferred to every other on account of its size and beauty, are the only remnant of all the public buildings, baths, canals, statues, etc., with which Herodes Atticus beautified Italy, Greece, and Asia. It was consecrated to his wife Regilla, a Roman lady. Of the oratorical talents of Herodes, which procured for him the flattering titles of the "tongue of the Greeks" and the "king of eloquence," only one monument remains to us, and the genuineness of it is doubtful. It is a sophistical declamation "On the State," included by I. Bekker in his "Oratores Attici." It by no means equals his fame.

Herodian, a Greek historian who held several public offices at Rome, and lived till some time after the year A. D. 238. His history is written in Greek, and comprises the period from the death of Marcus Aurelius to the year above mentioned. He himself says that the events of this period occurred in his own lifetime. The history, in which he seems to have taken Thucydides to some extent as a model, is in eight books, without chronological data, but written in a pure and dignified style, in a spirit of independence and impartiality. He has often been confounded with Herodian of Alexandria, who died A. D. 180.

Herodians, a short-lived party, who, for some reason or other, rallied round Herod the Tetrarch. As Herod had too little force of character to inspire enthusiasm, it was evidently his position which gained him followers. Now that Judea had a Roman governor, Herod of Galilee was the leading representative of Jewish nationality menaced by Rome. Similarly, the Pharisees were the defenders of the national faith against the influx of classic ethnicism. These united to entangle and destroy Jesus. (Matt. xxii: 15, 16; Mark iii: 6, xii: 13).

Herodias, a granddaughter of Herod the Great and Mariamne, daughter of Aristobulus and sister of Herod Agrippa I. She was first married to her uncle Herod Philip, but afterward abandoned him and connected herself with his brother Herod Antipas. It was by her artifice that Herod was persuaded to cause to be put to death John the Baptist, who had boldly denunciated the incestuous connection which subsisted between her and Herod.

Herodiones (-ō′nēz), the herons, a modern name for an order of birds including the herons proper, but also the bitterns, storks, spoonbills, ibises, etc.

Herodotus, the oldest Greek historian whose works have come down to us; born in Halicarnassus, Caria, in the fourth year of the 73d Olympiad, 484 B. C. If by the title "father of history," which has been bestowed on him by the general consent, be meant that he was the first who wrote history in a more elevated manner (or, according to Cicero, *historiam ornavit*), he fully deserves that title. Many authors, such as Hellanicus of Lesbos, Charon of Lampsacus, and Dionysius of Miletus, had even in some measure anticipated Herodotus in the subject of his work; but the works of those logographers as they are termed, were rather collections of tales more or less fabulous, narratives of travels, etc., than histories in the true sense of the word. His love of learning was early enkindled by his youthful studies, and by examples in his own family. The celebrated epic poet, Panyasis, who was regarded by several ancient critics as inferior only to Homer, was his uncle. His genius was animated by the works of the writers just mentioned: they excited in him the desire to visit the countries which were described in such glowing colors, and his circumstances permitted him to gratify his inclinations. Whether he had conceived the plan of his history, in which the results of his travels are preserved, before his long journey is uncertain.

Egypt, so celebrated for the wisdom of its institutions, seems to have been one of the most constant subjects of his attention. This country had long been rendered inac-

cessible to the rest of the world by the jealousy of its rulers and the prejudices of its inhabitants against foreigners. But a short time before Herodotus commenced his travels it had been opened to the Greeks; and though it was then almost entirely unknown, and every part of it has since been examined by crowds of travelers and described in almost every language, yet no author, ancient or modern, has given a more accurate and instructive account of it than Herodotus. He did not content himself with a knowledge of places; he investigated likewise the productions of the soil, the manners, customs, and religion of the people, the history of the last princes who reigned before the conquest of the country by the Persians, and many interesting particulars concerning the conquest itself. The second book of his history, which is devoted to the description of Egypt, is still our richest store of information concerning its ancient history and geography. From Egypt he proceeded to Libya, concerning which he collected a mass of information equally new to his contemporaries and valuable to us. His description of the country from the frontiers of Egypt to the Straits of Gibraltar is so consonant with the accounts of the most intelligent travelers that we cannot for a moment believe it founded on the relations of others.

He asserts himself that he resided some time in Tyre. He visited the coasts of Palestine, and thence continued his route to Babylon, then opulent and flourishing. His visit to Assyria has been doubted; but if we consider the different passages of his description of Babylon we must be convinced that none but an eyewitness could have given so exact an account of that great city and of the manners of the inhabitants. Having arrived in Scythia, then little known to the Greeks, he penetrated into its immense wilds by the routes which had recently been opened by the Grecian colonies on the Euxine, and thence passing through the Getæ into Thrace and Macedonia, he reached Greece by the way of Epirus. Herodotus expected to find at home that honor which was due his labors, and leisure to arrange the information which he had collected. But Lygdamis, who had usurped the supreme authority in Halicarnassus and put to death the noblest citizens, among others Panyasis, forced him to seek an asylum in the island of Samos.

Here, it is said by his biographer, Suidas, he wrote the first books of his history; but there is good reason to believe that they were written at a later period. Having formed a conspiracy with several exiles who entertained similar sentiments with himself, he returned to Halicarnassus and drove out the usurper, but without much advantage to his country. The nobles who had acted with him immediately formed an aristocracy more oppressive to Halicarnassus than the arbitrary government of the banished tyrant. Herodotus became odious to the people, who regarded him as the author of their aggravated sufferings, and to the nobles, whose proceedings he opposed, so that, bidding an eternal farewell to his unhappy country, he withdrew to the recently founded colony of Thurii, in Italy, where he spent the remainder of his life. Here, at an advanced age, we are told by Pliny, he wrote his immortal work. Lucian, not a very reliable authority on such a subject, states that it was written at Halicarnassus, and that he read the nine books into which it is divided before the Greeks assembled at the Olympic games about 456. It is further stated that the work was received with so much applause that the names of the nine Muses were applied to its several chapters, and that Thucydides, then scarcely 15 years old, was present at this recitation, and shed tears of admiration.

There is another tradition that Herodotus read his book at Athens in 445 or 446 B. C., and that he received a grant of 10 talents (nearly $12,500) from the public treasury. This tradition is not only in contradiction with the time at which he must have written his work, but is evidently but part and parcel of the charge which the Thebans brought against the historian that he was bribed by the Athenians. Whether there is any more authority for the statement that he read the history before the Corinthians it is impossible to say with any degree of certainty. It is mentioned only by Dion Chrysostomus. On the other hand, Pliny's statement that the work was written in his old age at Thurii is strengthened by the fact that events are noticed in the body of the book which occurred so late as 409 B. C. There is no evidence that he ever made two editions of his book; there is no trace of labor or revision. Its abrupt ending, and the fact that the author did not accomplish all he promised, prove almost beyond question that the history was the work of the last years of his life, and that death prevented him from completing it.

The history, as already remarked, is divided into nine books, each bearing the name of a Muse, and is written in the Ionic dialect. The object of the historian is to narrate the conflict between the Greeks and Persians, the representative race of the Eastern and of the Western world. His first care is to trace the enmity of the two races back to mythical times, and he considers the abductions of Io, Medea, and Helen as the primary causes of the sanguinary rivalry. He rapidly passes over the mythical period to come to Crœsus, King of Lydia, of whom and of his kingdom he gives a comparatively full history. The conquest of Lydia by Cyrus induces him

to relate the rise of the Persian monarchy and the subjugation of Asia Minor and Babylon. The history of Cambyses and his Egyptian expedition leads him to introduce the valuable details of the history, geography, and manners and customs of that country, which occupy the second book. The Scythian expedition of Darius causes the historian to treat of the Scythians and the North of Europe; and the subsequent extension of the Persian kingdom affords him the opportunity for giving an account of Cyrene and Libya. In the meantime the revolt of the Ionians breaks out, which eventually brings on the conflict between Greece and Persia. An account of this outbreak and of the rise of Athens after the expulsion of the Peisistratidæ, is followed by what properly constitutes the principal part of the work, and the history of the Persian war now runs on in an uninterrupted stream until the taking of Sestos. The many digressions and episodes do not impair the plan and unity of the book. It is pervaded by a profoundly religious idea of a divine power, existing apart and independent of man and nature, which keeps all things in equilibrium, assigns to each being its path, and keeps it within its bounds.

Hérold, Louis Joseph Ferdinand (ā-rōld′), a French composer; born in Paris, France, Jan. 28, 1791. He studied at the conservatoire of music in that city. His earliest successes were achieved with "Mademoiselle de la Vallière" (1812), a cantata, which gained him a traveling scholarship; the opera "The Youth of Henry V." (1815); and the comic opera, "The Rosieres" (1816). None of his succeeding pieces met with success, till the opera "Marie" appeared in 1826. "Zampa" (1831) and "Le Pré aux Clercs" (The Clerics' Meadow, 1832), which followed next, were both decidedly successful; the former is still put on the stage. He died in Thernes, near Paris, France, Jan. 19, 1833.

Heron, the common name of birds of the genus *Ardea*, constituting with the bitterns the family *Ardeidæ*, type of what is now commonly regarded as a separate order of birds, the *Herodiones*. The herons are very numerous, and almost universally spread over the globe. They are distinguished by having a long bill cleft beneath the eyes, a compressed body, long slender legs naked above the tarsal joint, three toes in front, the two outer united by a membrane, and by moderate wings. The tail is short, rounded, and composed of 10 or 12 feathers. The common heron (*A. cinerea*) is about three feet in length from the point of the bill to the end of the tail, builds its nest in high trees, many being sometimes on one tree. Its food consists of fish, frogs, mollusks, mice, moles, and similar small animals. It has an insatiable voracity, and digests its food with great rapidity. It haunts fresh water streams, marshes, ponds, and lakes, as also the sea-shore. It was formerly in high esteem for the table, and, being remarkable for its directly ascending flight, was the special quarry pursued in falconry by the larger hawks. The great heron (*A. herodias*) is an inhabitant of America, and is called also great blue heron; the great white heron or egret (*A.* or *Herodias alba*) belongs to Europe; and the green heron (*A. virescens*), the flesh of which is much esteemed, is a native of North America.

Herostratus. See EROTRATUS.

Herpes, a skin affection, composed of vesicles grouped on an inflamed surface, as in the lip (*herpes labialis*) in pneumonia, or as shingles (*herpes zoster*) where they form a belt round half the body, never meeting notwitnstanding the old superstition that such meeting is fatal; painful and affecting the nerves and general health. Nervine tonics internally, and cooling unguents or lotions are the necessary treatment. Duration, from 16 to 20 days.

Herpetology, that branch of natural history which treats of reptiles.

Herpin, Luce. See PEREY, LUCE.

Herrera, Francisco, surnamed EL VIEJO ("the Elder"), a Spanish painter; born in Seville, Spain, in 1576. He became the founder of a school. His masterpiece was the "Last Judgment," in a church at Seville. Besides historical pieces, he also painted such subjects as wine-houses, fairs, carnivals, etc.; he was a clever worker also in bronze. Some of his best works are in the Louvre at Paris. In 1650 he removed to Madrid, and died there in 1656.

HERON.

Herrera, Francisco, surnamed EL MOZO ("the Younger"), a Spanish painter; youngest son of the preceding; born in Seville, in 1622. He studied under his father, but to escape his roughness and cruelty, ran away to Rome, where he became celebrated for pictures of still life, especially for fish-pieces. Returning to Spain after his father's death, he at first settled in Seville, and was in 1660 appointed sub-director of the academy there; but he soon betook himself to Madrid, where he became painter to the king. His best works are a fresco, "The Ascension," in the Atocha Church in Madrid, and "San Francisco," in Seville Cathedral. Herrera died in Madrid, in 1685.

Herrera, José Joaquin de, a Mexican military officer; born in Jalapa, in 1792; joined the Mexican army in 1809; was promoted Brigadier-General in 1821; aided in overthrowing Iturbide in 1823; and was made secretary of war in 1824. He was president of Mexico in 1844–1845 and 1848–1851; was second in command of the army during the invasion by the United States troops in 1847. He died in Tacubaya, Mexico, Feb. 10, 1854.

Herrera-Tordesillas (tōr-dā-sēl'yäs), **Antonio de,** a Spanish historian; born in 1549. He wrote "General History of the Spanish Conquests in America," a very elaborate and valuable work; "General History of Spain during the reign of Philip II."; etc. He died in 1625.

Herrick, Mrs. Christine (Terhune), an American writer on domestic economy; born in Newark, N. J., in 1859. Her home was in New York. She wrote: "Housekeeping Made Easy" (1888); "The Little Dinner"; "Liberal Living upon Narrow Means"; "First Aid to the Young Housekeeper" (1900), etc.

Herrick, Robert, an English lyric poet; born in London, England, Aug. 20, 1591; studied at Cambridge University; studied law at Trinity Hall; accepted the living of Dean Prior, near Totness, Devonshire, in 1629, but was rejected in 1647 for adherence to the Royalist side, being restored, however, in 1662. He wrote "Hesperides" (1648). A number of his shorter songs, *e. g.*, "Gather ye rosebuds while ye may"; "Cherry Ripe," etc., have been set to music. A complete edition of his works was published in 1876. He died in Dean Prior, Devonshire, England, in October, 1674.

Herrick, Robert, an American poet; born in Cambridge, Mass., in 1868; was graduated at Harvard in 1890; Assistant Professor of Rhetoric at the University of Chicago, 1895-1901; Professor of English there after 1905; works: "The Web of Life"; "The Man Who Wins"; etc.

Herrick, Mrs. Sophie McIlvaine (Bledsoe), an American editor and microscopist, daughter of Albert T. Bledsoe; born in Gambier, O., March 26, 1837. She became editor of the "Southern Review" in 1877, and afterward joined the editorial staff of "Scribner's Monthly." She wrote "Wonders of Plant Life under the Microscope" (1883); "The Earth in Past Ages"; "A Century of Sonnets" (1902).

Herrig, Hans (her'rig), a German poet, dramatist, and editor; born in Brunswick, Dec. 10, 1845. He abandoned law for literature and journalism, joining the staff of the "Deutsches Tageblatt" when it started. His plays were numerous and successful, notably "Alexander the Great"; "Jerusalem"; "Nero"; and others serious in subject. His greatest success was with the "church play" arranged and written for the Luther Jubilee of 1883, and widely performed. His poetry includes both the light and serious, "The Fat King" among the former and "The Swine" among the latter. He died in Weimar, May 4, 1892.

Herring. There are many species of the genus *Clupea*, known under the name of herring (see ICHTHYOLOGY); but the *C. harengus* is that which frequents the coasts of the United States and Great Britain in such numbers, and which furnishes so important an article of food to so many inhabitants. Herrings are found in the Atlantic from rather high Northern latitudes, as low as the N. coasts of France. They are met with in vast shoals on the coast of the United States, as low as the Carolinas. In Chesapeake bay they often cover the shore in such quantities as to become a nuisance. We find them also in the seas adjoining Kamchatka; and probably they reach Japan. Herrings feed much on minute crustaceans, and sometimes on their own fry. They are full of roe in the end of June, and continue in perfection till the beginning of winter. It is in summer that the great majority seem to spawn, but in certain localities numbers of them spawn in winter. How prolific they are may be guessed from the fact that 70,000 eggs have been counted in one female. The young herrings approach the shores in summer, and may then be from half an inch to two inches long. At a larger size they are eaten as whitebait. The herring was unknown to the ancients, being rarely if ever found within the Mediterranean. The Dutch are said to have engaged in the fishery in 1164. The invention of pickling or salting herrings is ascribed to the Dutch in the 14th century. Since this early period the Dutch have uniformly maintained an important share in the herring fishery; but owing to the Reformation and the relaxed observance of Lent in Catholic countries, the demand for herrings on the conti-

nent is relatively less than in the 14th and 15th centuries.

Herrnhut (hern'höt), a town in the kingdom of Saxony, 18 miles S. E. of Bautzen; celebrated as a chief seat of the MORAVIANS (*q. v.*) or Herrnhuters, who settled here in 1722.

Herron, George Davis, an American lecturer and author; born in Montezuma, Ind., Jan. 21, 1862; was educated at Ripon College, Wis., and in Europe; pastor of Congregational Churches in Lake City, Minn., and Burlington, Ia., Professor of Applied Christianity in Iowa College, 1893-1900; leader of "The Social Crusade," a religious and socialist movement. The subject of his lectures was the relations of Christianity to existing social conditions. He wrote "The Larger Christ" (1891); "Call of the Cross" (1892); "The New Redemption" (1896); "The Christian Society"; "The Christian State" (1895); "Between Cæsar and Jesus" (1899); etc.

Herschel, Caroline Lucretia, an English astronomer; sister of Sir William; born in Hanover, March 16, 1750. In her 22d year she left her native place and went to England to reside with her brother, then organist in Bath. When William abandoned his former profession in favor of astronomy she became his constant helpmate, and when he was appointed private astronomer to George III. she discharged efficiently all the duties of an assistant astronomer, for which she was allowed a small salary by the king. Though these duties were of a very arduous nature she yet found time to conduct a series of observations of her own with a small Newtonian telescope which her brother had made for her. She devoted special energy to the discovery of comets, and was so successful as to be entitled to claim the priority of discovery of at least five. Several remarkable nebulæ and clusters of stars included in her brother's catalogue were described from her original observations. In 1798 a valuable work from her pen was published by the Royal Society under the title of "A Catalogue of Stars Taken from Mr. Flamsteed's Observations, with Introductory Remarks by W. Herschel, LL.D." On her brother's death in 1822 she returned to her native country, where she died Jan. 9, 1848, after an unusually protracted life, distinguished by useful scientific labors. The Royal Society recognized the full value of her astronomical labors by bestowing on her in 1828 their gold medal, and some time afterward by also conferring on her the privileges of honorary membership.

Herschel, John, an English physicist; youngest son of Sir John F. W. Herschel; born in Cape of Good Hope, Oct. 29, 1837. He entered the Bengal Engineers, in 1856; landed in India in January, 1859, and after six months at Rurki was appointed to the great Trigonometrical Survey, in which department he served till date of his retirement in 1886; was employed by the Royal Society to observe the total eclipse of sun, 1868 (and again 1871) spectroscopically, and was among the earliest to view colored flames through the prism and thus to lay foundation of our present vastly extended knowledge of the sun's constitution; he also observed many of S. nebulæ with same instruments; the results of these observations are printed in "Proceedings of the Royal Society."

Herschel, Sir John Frederick William, an English physicist; only son of Sir William; born near Windsor, March 7, 1792. He was educated at Hitcham under the care of Dr. Gretton, then at Eton, and subsequently at Cambridge, where he distinguished himself by his mathematical genius. In 1813 he graduated B.A., and was senior wrangler and Smith's prizeman. His first publication of note was "A Collection of Examples of the Application of the Calculus to Finite Differences" (1820). It was not till the death of his father in 1822 that he devoted his special attention to the continuation of those labors of astronomical research which have made the name of Herschel so famous. He limited his first exertions to a reëxamination of the nebulæ and clusters of stars discovered by his father and described by him in three catalogues presented to the Royal Society, and published in their "Transactions" for the years 1786, 1789, and 1802. In this labor he associated himself with Mr. (afterward Sir) James South, and in 1824 they reported to the Royal Society the position and apparent distances of 380 double and triple stars, obtained by more than 10,000 measurements. This memoir attracted the notice of the French Academy, and they voted it their astronomical prize; and two years later the gold medal of the Royal Society was awarded to each of the young astronomers. The results of the reëxamination were given in 1833 to the Royal Society in the form of a catalogue of stars in order of their right ascension. The catalogue contained observations on 525 nebulæ and clusters of stars not noticed by his father, and on a great number of double stars, between 3,000 and 4,000 in all.

Meantime he was not idle in the fields of scientific literature. An article from his pen on "Physical Astronomy" appeared in the "Encyclopædia Metropolitana" in 1823. His "Treatise on Sound" also appeared in the "Encyclopædia Metropolitana" in 1830, as did his "Treatise on the Theory of Light" in 1831, in which year also appeared in Lardner's "Cabinet Cyclopædia" his well-known "Preliminary Discourse on the Study of Natural Philos-

ophy," one of the most charmingly written books on science. In 1831 he was created a knight of the royal Hanoverian Order. In 1833 was published in Lardner's "Cabinet Cyclopædia" a "Treatise on Astronomy," which proves his power as a popular expositor of that science. It was subsequently enlarged into "The Outlines of Astronomy," of which several editions have been published. Before the publication of this work, however, he had undertaken a private expedition to the Cape of Good Hope for the purpose of carrying out in the Southern Hemisphere a set of observations similar to those he had made in the Northern. He was offered for himself and his instruments a passage in a king's ship, but declined the offer, being resolved to bear all the expenses of the expedition himself. Four years were spent at Feldhuysen, near Cape Town (1834–1837). His great object was to discover whether the distribution of the stars in the Southern Hemisphere corresponded with the results of his father's labors, prosecuted mainly on the opposite side of the Galactic Circle. That the observations might be strictly comparable they were made by the same method as Sir William's and with a telescope of the same optical power. The whole number of stars counted in the telescope amounted to 68,-948, which were included within 2,299 fields of view.

By a computation, based on the star gauges in both hemispheres relative to the Milky Way, Sir John found that the stars visible in a reflecting telescope of 18 inches aperture amounted to 5,331,572; and, more than this, the number really visible in the telescope was vastly greater, for in some parts of the Milky Way the stars were found to be so crowded in space as to defy all attempts to count them. The results of this vast labor were published in 1847, the expense being borne by the Duke of Northumberland. On the return of the astronomer to England in 1838 he was received with every public honor; he was made a D. C. L. of Oxford; on the queen's coronation he was created a baronet. In 1848 he was president of the Royal Astronomical Society, and in 1850 was appointed Master of the Mint, an office which he resigned in 1855 on account of ill health. He died at his country residence in Kent on May 11, 1871, and was buried in Westminster Abbey. Besides the treatises above mentioned Sir John contributed articles to the Edinburgh and "Quarterly Reviews" on a wide range of subjects. Those, along with addresses delivered before the Astronomical Society and the British Association, and a number of poems, original and translated, were published in 1857. Pure literature seems to have had considerable attractions for him in his later years, for in 1866 appeared his "Translation of the Iliad of Homer in Hexameters"; this attempt is, however, more to be commended on the score of literal fidelity than of real poetic spirit.

Herschel, Sir William, an astronomer, son of a musician of Hanover, was born there on Nov. 15, 1738. Being destined by his father for his own profession, he was placed at the age of 14 in the band of the Hanoverian foot-guards. He went to England in 1757 and was employed in the formation of a military band, and in conducting, while organist at Bath, several concerts, oratorios, etc. Though enthusiastically fond of music, he had for some time devoted his leisure hours to the study of mathematics and astronomy; and being dissatisfied with the only telescopes within his reach, he set about constructing one for himself, in which arduous undertaking he succeeded, having in 1774 finished an excellent reflecting instrument of 5½ feet with his own hands. Encouraged by his success he proceeded to complete larger telescopes, and soon constructed a 7, a 10, and a 20-foot reflector, having in the latter case finished nearly 200 object mirrors before he could satisfy himself. From this period he gradually withdrew from his professional engagements. Late in 1779 he began a regular survey of the heavens, star by star, with a 7-foot reflector, and after 18 months' labor discovered, March 13, 1781, a new primary planet, named by him the Georgium Sidus, but now known as Uranus. George III. gave him a pension, enabling him to devote the rest of his life to astronomy.

At Slough, near Windsor, he commenced the erection of a telescope of the enormous dimensions of 40 feet, and completed it in 1787. Its diameter was 4½ feet, and it weighed 2,118 pounds. With this powerful instrument he continued to prosecute his discoveries, regularly communicating the results to the Royal Society till the year 1818. In 1783 he had discovered a volcanic mountain in the moon, and from further observations made with his large instrument in 1787 two others were distinguished. He discovered, as he believed, that the Georgium Sidus was surrounded with six satellites; but there are still doubts about their number. He also discovered two of the satellites of Saturn, and the fact that his system of rings revolved, and he measured his rotation and that of Venus, announced to the world that there were binary stars in the heavens, etc. The four small planets discovered by Piazzi, Olbers, and Harding — Ceres, Pallas, Juno, and Vesta — he observed with his usual accuracy. He fixed their diameter, which Schröter had determined to be from one to four seconds, at less than one second, and made an ingenious hypothesis in respect to their nature and formation. An account of most of his labors is found in the "Philosophical Trans-

actions" and other works. Herschel received much assistance in making and recording observations from his sister Caroline; and later his brother, a skillful optical instrument maker, lent him valuable aid. In 1802 he laid before the Royal Society a catalogue of 5,000 new nebulæ, nebulous stars, planetary nebulæ, and clusters of stars which he had discovered, and in consequence of the important additions made by him to the stock of astronomical knowledge, received from the University of Oxford the honorary degree of Doctor of Laws — an honor which was followed in 1816 by the Guelphic order of knighthood from the king. He continued his astronomical observations till within a few years of his death, which took place in Slough on Aug. 25, 1822.

Herschelian Rays, non-luminous rays outside the red of the solar spectrum; they were first discovered by Sir William Herschel.

Herschelian Telescope, a telescope constructed by Sir William Herschel, in 1789, or any one of a similar type. The mirror was so inclined that the image of a star was formed on the side of the telescope near the eye-piece, hence it was sometimes called the front-view telescope. The rays undergo only a single reflection, and there is therefore but little loss of light. The magnifying power is the quotient when the powerful focal distance of the mirror is divided by the focal distance of the eye-piece. The instrument constructed by Herschel was 40 feet long, with a mirror of 50 inches diameter. It was the most magnificent telescope which had ever been made, and was not exceeded till that of Earl Rosse was constructed. See TELESCOPE.

Herschelite (named after Sir John Herschel), an orthorhombic, colorless or white translucent mineral of somewhat vitreous luster, optically biaxial. Hardness, 4.4; sp. gr., 2.06. Composition: Silica, 46.46-47.46; alumina, 19.21-20.90; lime, 0.38-4.75; soda, 5.27-9.35; potassa, 2.88-4.39, and water, 17.65-17.86. Found at Aci Real in Sicily.

Herschell, Lord Farrer, the first baron of that name; born in London, England, Nov. 2, 1837. He was a privy councilor; a Knight of the Grand Cross of the Bath; doctor of civil law; doctor of laws; chancellor of London University; and was appointed British member of the Venezuela and British Guiana boundary arbitration tribunal in 1897. He was knighted in 1880, and created a peer in 1886. He was graduated at London University with classical honors; became a barrister of Lincoln's Inn in 1860; queen's counsel in 1872; bencher of Lincoln's Inn in 1872; recorder of Carlisle 1873–1880; solicitor-general 1880–1885; lord high chancellor in 1886, and 1892–1895. He was appointed one of the high joint commissioners from Great Britain, on the Anglo-American Commission, designed to settle existing differences between the United States and Canada, of which he became president. During the sitting of the commission in Washington, D. C., in February, 1899, he had a severe fall, from the effects of which he died in that city, March 1. The United States government tendered the use of a naval vessel to convey his remains to England, but the courtesy was declined and a British warship performed that mission.

Herse, or Hearse. (1) A framework whereon lighted candles were formerly fixed, and which was used as a temporary canopy over the coffins of distinguished persons during the funeral ceremonies.

(2) a temporary monument raised over a grave; a framework over an effigy on a tomb.

(3) A carriage in which corpses are drawn to the grave.

(4) In fortification, a kind of gate or portcullis, with iron bars like a harrow, set in with iron pikes, placed above gates, and lowered to impede the advance of an enemy.

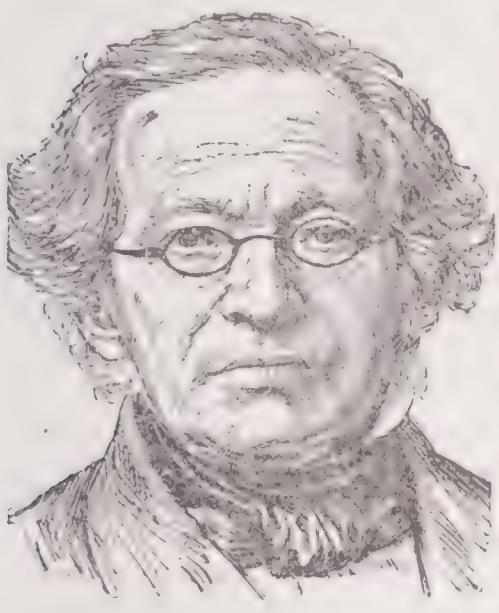
(5) In skin-dressing, a rectangular frame for stretching a skin, which is to remove its wrinkles and hold it while being scraped. Skins for parchment are thus stretched for fleshing, scraping, and grinding.

Hertford, the county town of Hertfordshire, England, 26 miles N. of London; on the Lea, which is navigable for barges to this point. It contains few buildings of any architectural importance, save one ancient church; but there are also a town hall (1768), an infirmary, and a corn exchange and free library (1859). Hertford has a grammar school and several charity schools, while at the entrance into the town on the London Road is a preparatory school in connection with Christ's Hospital, London. A considerable trade is carried on in corn, malt, and flour. The head spring of the New river rises about a mile E. of the town, and 2 miles W. is Panshanger, the seat of Earl Cowper, with its valuable collection of pictures. Of the old castle of Hertford, commenced by Edward the Elder about 905 to protect the inhabitants from the incursions of the Danes, and strengthened by William the Conqueror, but a small portion now remains; the present castle was built by William Cecil, Earl of Salisbury, or Sir William Harrington, in the reign of James I., and in 1805–1809 was occupied by the East India Company as a temporary college during the erection of Haileybury.

Hertha, the goddess of Earth, worshiped by the ancient Germans. According to Tacitus, she was adored chiefly among the

Suevi, her sanctuary being in a grove on an island in the sea. Sometimes she issues from her island, takes her seat in her chariot drawn by cows, and goes out through the world, with the effect of making peace everywhere prevail. In astronomy, an asteroid, the 135th found. It was discovered by Peters, Feb. 18, 1874.

Hertz, Henrik (herts), a Danish dramatic poet; born in Copenhagen of Jewish parents, Aug. 25, 1798. He published several comedies anonymously in 1826–1830. "Poetical Epistles from Paradise," in which he imitated and satirized the affected style and spirit of his contemporaries, raised a great commotion at the time. He wrote a great number of poems and novels, but his best works are his plays. Among his best known are "The Savings Bank," "Ninon," "Svend Dyring's House," and "King René's Daughter," which has been translated and performed in France, Germany, and Great Britain. He died in Copenhagen, Feb. 25, 1870.



HENRIK HERTZ.

Hertz, Wilhelm, a German poet; born in Stuttgart, Sept. 24, 1835. On leaving college he devoted himself to agricultural pursuits, after which he studied at Tübingen. He was encouraged to write by a Munich literary circle including Geibel, Heyse, Bodenstedt, and others. In 1859 appeared his "Poems," remarkable for delicate sentiment, warmth of feeling, and perfect technique. Among his best-known productions are: "Launcelot and Guinevere"; "Henry of Suabia"; and especially "Tristan and Isolde." He was Professor of Literature at the University in Munich, and a lecturer and critic of high authority.

Heruli (her'ū-lī), a Teutonic tribe, from the coast of the Baltic, which descended the Danube to the Black Sea, sailed through the Hellespont in 262, with other Gothic tribes, and assailed the cities of Greece, burning, among others, the famous temple of the goddess Diana at Ephesus. They were met near Athens by Dexippus, who routed them in 267. They again wandered N., invaded Italy, and overthrew the W. empire in 476. The Longobardi almost destroyed them in 512, and their name is mentioned for the last time in history at the defeat and death of Teias by Narses, in 553.

Hervé (er-vā'), proper name FLORIMOND RONGER, a French composer; born in Houdain, near Arras, France, June 30, 1825. At first he was organist at several churches in Paris. But in 1848 he took to the operatic stage, making his first appearance in an operetta composed by himself, "Don Quixote and Sancho Panza." Then, after officiating for three years as director of the orchestra at the theater of the Palais Royal, he worked as singer, composer, director, and actor in various theaters. Some of his light operas have had very successful runs, such as "The Broken Eye," "Chilperic," and "Little Faust." He died Nov. 5, 1892.

Hervey, James, an English author; born in Hardingstone, near Northampton, England, Feb. 26, 1714. He was educated at Oxford, and was first curate and afterward incumbent of Weston-Favel and Collingtree, both near Northampton. The best of his works were "Meditations and Contemplations" (1746), including his most famous production, "Meditations among the Tombs"; "Contemplations on the Night and Starry Heavens" (1747); and "Theron and Aspasio" (1755). He died Dec. 25, 1758.

Hervey Archipelago. See COOK'S ISLAND.

Hervilly, Ernest d' (er-vē-yē'), a French journalist; born in Paris, May 26, 1839. From railroad operative he became editorial and sketch writer, contributing to the "Rappel" in 1872 under the pseudonym "The Passer-by." A few years later appeared volumes of verse, "The Kisses" and "The Harem," which won general admiration. Humorous sketches—"Tales for Great Personages," "Pastime Stories," "The Weapons of Women," and others—extended his fame throughout France; and his plays, "The True Invalid" especially, have been very successful in Paris.

Herwarth von Bittenfeld, Karl Eberhard (her'värt fon bit'ten-felt), a Prussian general; born in 1796. He gained his first laurels in the war of liberation, especially in the battle of Leipsic. In 1864, raised to the rank of general, he acquired great fame through his daring capture of the isle of Alsen. In the campaign of 1866 he was entrusted with the occupation of Saxony, and then with the command of the army which advanced from Saxony into Bohemia. He contributed largely to the brilliant victories of Hühnerwasser, Münchengrätz, and Königgrätz. In 1870, on the outbreak of the Franco-German war, he was made governor of the Rhine provinces, in 1871 a general field-marshal. He died in Bonn, Sept. 2, 1884.

Herzegovina (hert-se-gō-vē′nä), or **Hersek** (her′sek), a former province of the Ottoman Empire, nominally forming (with the exception of Castel-nuova, and some adjoining districts) a part of the *eyalet* or pashalic of Bosnia; bounded N. by Croatia, S. by Montenegro, E. by Bosnia, and W. by Dalmatia; area 3,616 square miles; pop. (1904) about 200,000. Principal cities, Sarajevo (the capital), and Mostar. Its political and ethnographical character coincide with those of Bosnia. Herzegovina, Bosnia, and Novi-Bizar were occupied in 1878 under the Berlin treaty, and the government was administered by Austria-Hungary till Oct. 7, 1908, when Austria-Hungary suddenly annexed the entire Turkish territory.

Herzen, Alexander (hert′sen), a Russian writer; born in Moscow in 1812. While a student at Moscow he imbibed extreme philosophical and socialistic views, which brought about his imprisonment and exile. He was afterward pardoned, but spent the latter part of his life (from 1847) abroad. Among his numerous works are the novels, "Who Is to Blame?" and "Dr. Krupow"; "Letters From France and Italy"; "On the Development of Revolutionary Ideas in Russia"; "Recollections of My Lifetime"; "Memoirs of the Empress Catharine"; etc. He died in Paris, France, in 1870.

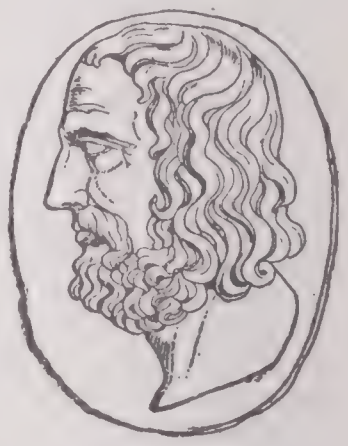
Herzog, Johann Jakob (hert′soG), a German Protestant theologian; born in Basel, in 1805. He was successively Professor of Historical Theology at Lausanne, Church History at Halle, and latterly at Erlangen. His chief works are "Calvin and Zwingli," "Life of Œcolampadius and the Reformation in Basel"; and his great "Encyclopædia of Useful Information for the Protestant Theology and Church," a vast collection of German learning and speculation, of which he was the editor, and to which he contributed over 500 articles. He died in Erlangen, in 1882.

Hesekiel, Georg Ludwig (he-zā′ke-el), a German author; born in Halle, Aug. 12, 1818. He was intended for the Church, but preferred literature and political journalism. His early prose and poetry were of a trifling and fleeting character, but his "Prussian Songs" in 1846 made him famous. Then followed numerous political novels, notably "Before Jena"; "The Calm Before the Storm"; and his masterpiece, "Under the Iron Tooth." Other poems are "New Songs," and several volumes devoted to patriotic themes. His "Prince Bismarck" is a popular and important biographical study. He died in Berlin, Feb. 26, 1874.

Hesekiel, Ludovika, a German novelist, daughter of Georg L. Hesekiel; born in Altenburg, July 3, 1847. Her forte was historical-romance composition; and she wrote a sequel to one of her father's books, under the title "From Brandenburg to Bismarck." Her most successful productions are "God With Us," and a collection of short stories. Her study of "Elizabeth Louise, Queen of Prussia," is brilliant and valuable. She died in Neustadt, April 6, 1889.

Heshbon, a celebrated city of the Amorites, 20 miles E. of the mouth of the Jordan (Josh. iii:10; xiii:17). It was given to Reuben; but was afterward transferred to Gad, and then to the Levites. It had been conquered from the Moabites by Sihon, and became his capital; and was taken by the Israelites a little before the death of Moses (Num. xxi:25; Josh. xxi:39). After the 10 tribes were transplanted into the country beyond the Euphrates, the Moabites recovered it (Isaiah xv:4). Its ruins are now called Hesban, and cover the sides of a hill 7 miles N. of Medeba.

Hesiod (hē′si-od), one of the earliest Greek poets; born in Ascra, Bœotia, and usually supposed to have lived in the 8th century B. C. A family dispute drove him from Ascra, and he settled at Orchomenos. The works attributed to him are the poems entitled, "Works and Days," "Theogony," "Shield of Hercules," and the lost "Catalogue of Women." The poetry of the "Works and Days" is of a homely and didactic character, dealing with the practical interests of common life. The "Theogony," however, is of a different character, being an attempt to present a systematic view of the origin and powers of the gods, and of the order of nature. It is of great importance for the history of the religion of the Greeks.



HESIOD.

Hesione (hē-sī′ō-nē), in Greek legend, a daughter of Laomedon, king of Troy, and sister of Priam. Neptune, in his anger against her father for having failed in a promise toward him, sent a monster to ravage his country. The oracle consigned her, as an expiatory victim, to it; Hercules delivered her as she was about to be devoured by the monster; but not obtaining the reward promised by her father, he carried her off, and gave her in marriage to his friend Telamon. The abduction of Hesione became the Trojan pretext for the carrying off of Helen by Paris.

Hesperetic Acid, in chemistry, $C_{10}H_{10}O_4$, obtained by the action of alkalis on hesperidin. It melts at 225°. Fused with caustic potash, it is decomposed into acetic and protocatechuic acids, hydrogen being liberated.

Hesperetin (-per'e-tin), in chemistry, $C_6H_5O_2 \cdot C_{10}H_9O_3$. It is obtained along with glucose by the action of dilute acids on hesperidin. It is recrystallized from ether; the crystals are white, and melt at 223°. Hesperetin is really insoluble in alcohol. Heated to 100° with caustic potash, it yields hesperetic acid and phloro-glucin.

Hesperia (-pē'ri-ä), in astronomy, an asteroid, the 69th found; discovered by Schiaparelli, April 29, 1861, when the astronomer Luther first saw Leto. In entomology, the typical genus of the family *Hesperidæ*. The species fly with extreme rapidity.

Hesperidæ, or **Hesperiidæ,** a family of *Rhopalocera* (butterflies). The antennæ, which are widely separated, are long and abruptly hooked; the body is robust; the six legs of uniform size. The flight is short and jerking, whence they are popularly called skippers. Larva like that of the cabbage butterfly, but with a much larger head. It rolls leaves into cylindrical sheaths; the chrysalis is inclosed in a transparent cocoon. A common one is *Pamphila sylvanus*, or the large skipper.

Hesperideæ, an order in Linnæus' "Natural System of Botany." He included under it the genera *Citrus*, *Styrax*, and *Garcinia*.

Hesperidene, $C_{10}H_{16}$, a terpene contained in the volatile oil of orange peel. It boils at 178°. Heated with phosphorus pentasulphide, it yields cymene.

Hesperides (-per'i-dēz), in Greek mythology, the name of the famous sisters, who, assisted by the dragon Ladon, guarded the golden apples which Hera had received, on her marriage with Zeus, from Ge. Their genealogy, as well as their number are variously given by mythologists. They were, however, commonly set down at four, whose names were Ægle, Erythia, Hestia, and Arethusa. The locality of the gardens was also a matter of controversy, the two favorite opinions placing them W. of Mount Atlas, and N. of the Caucasus. With the assistance of Atlas the apples were stolen by Hercules, who killed the dragon.

Hesperidin, or **Hesperidine,** in chemistry, $C_{22}H_{26}O_{12}$, a glucoside extracted from dry, unripe bitter oranges. They are exhausted with water, and the residue is treated with a mixture of equal parts of alcohol and water, containing 1 per cent. of caustic potash; on adding HCl, impure hesperidin separates out. It crystallizes from water, alcohol, or dilute acids in white, microscopic needles. It is insoluble in ether; it is soluble in dilute potash, and the solution becomes orange yellow on standing. When this solution is evaporated to dryness, and the residue treated with dilute sulphuric acid, it turns red, then violet. Fused with caustic potash, hesperidin yields protocatechuic acid.

Hesperidium, a many celled, few seeded superior indehiscent fruit, covered by a spongy separable rind, formed by the thickening of the mesocarp; the endocarp, which is membranous, forming several loculaments, easily separable from each other, and containing a mass of pulp in which the seeds are imbedded. Example, the orange. Lindley places the hesperidium under his class *Syncarpi*.

Hesperiidæ. See HESPERIDÆ.

Hesperis, dame's violet, a genus of cruciferous plants, family *Sisymbridæ*. *H. matronalis* is a plant with white or lilac flowers, odorous in the evening.

Hesperornis, a remarkable extinct form of bird, the remains of which have been met with in the American cretaceous deposits. As described by Professor Marsh, it possessed small pointed reptilian teeth, which were implanted in a deep continuous groove, somewhat like those of the ichthyosaurus. Its brain was small and more reptilian in type than that of any adult bird as yet examined. It appears to have been a large diving bird, measuring over five feet from the point of the bill to the end of the toes. Its wings were rudimentary, its legs powerful, and its feet well adapted for rapid progression in water. The tail was broad, could move up and down, and was probably used as a rudder or swimming paddle. The long slender jaws were united in front only by cartilage, as in serpents, and had on each side a joint which admitted of some motion, so that the power of swallowing was doubtless equal to almost any emergency.

Hesperus (hes'pe-rus), the Greek name for Venus as the evening star. Hence the Alexandrian grammarians called Italy, and sometimes all Western Europe, Hesperia "The Western land."

Hess, Heinrich von, a German painter; born in Düsseldorf in 1798. He was of a family illustrious in art, and was first taught by his father. He was sent to Rome under the patronage of the King of Bavaria, and in 1826 was appointed professor in the Academy of Munich, and director of the Painted-Glass Manufactory. His most celebrated frescoes are those of All-Saints Church, the Court Chapel, and the basilica of St. Boniface, the latter representing scenes in the life of the saint. Among his other works are a "Holy Family," exhibited in 1817; "Faith, Love, Hope"; "Apollo and the Nine Muses," painted during his stay at Rome; and a "Last Supper." The works of this great artist form one of the principal attractions of Mu-

nich. He obtained great reputation also as a portrait-painter. He died in Munich, in 1863.

Hesse (hes), or **Hessen** (hes'sen), anciently a territory of Germany; mainly between the Neckar, Rhine, Main, Lahn, and Fulda rivers. After various fortunes it was ruled by the landgrave Philip I., who succeeded in 1509, and at his death in 1567 divided his dominions among his four sons. The death of two of these, however, reunited the territories in part, so that there remained only the two main divisions of Hesse-Cassel and Hesse-Darmstadt, the latter now known simply as Hesse.

Hesse, or Hessen, Grand Duchy of, formerly known as Hessen-Darmstadt, an independent state of South Germany, consisting of sundry distinct portions; area, 2,966 square miles; pop. (1905) 1,209,175. Of the two main portions, one (forming the provinces of Rheinhessen on the left, and Starkenburg on the right bank of the Rhine) lies immediately to the N. of Baden, the other, Oberhessen (Upper Hesse), is entirely inclosed by the Prussian province of Hessen-Nassau. Oberhessen is generally mountainous; the provinces Starkenburg and Rheinhessen are also mountainous toward their frontiers, more especially in the S. E., but there are also extensive plains belonging to the valleys of the Main and the Rhine. The climate is greatly diversified, being cold and bleak in the mountainous districts, and mild and pleasant in the valleys of the Rhine and the Main. Much of the soil, particularly in the provinces of Starkenburg and Rheinhessen, is remarkably fertile. The vine forms a most important object of culture, and fruit is very abundant. Principal towns, Darmstadt, the capital; Mainz, Giessen, Bingen, and Worms. About two-thirds of the inhabitants are Protestants.

The grand-duchy of Hesse originated in the division of the landgraviate of Hesse in 1567 (see HESSE). In 1806 the landgraviate was erected into a grand-duchy with an enlarged territory by Napoleon. It was reduced to its present limits in 1866, when it had to cede to Prussia some districts in the N., besides Hesse-Homburg, which, after being separated from it since 1596, had been reunited to it in the beginning of the year in which it was ceded. The reigning grand-duke, Ludwig (Louis), was married to Princess Alice of Great Britain.

Hesse-Cassel (hes'kas'el), till 1866 a German electorate, now forming the government district of Cassel in the Prussian province of HESSE-NASSAU (*q. v.*); area, 3,700 square miles. The landgraviate of Hesse-Cassel was formed by William IV., eldest son of Philip the Magnanimous, who died in 1567. Constituted an electorate in 1803, it was occupied by the French in 1806, incorporated with Westphalia in 1807, and reconstituted an electorate in 1813. The elector having joined Austria in 1866, Hesse-Cassel was incorporated with Prussia, as part of the province of Hesse-Nassau.

Hesse-Homburg (hes'hom-burg), a former landgraviate of Germany; consisted of the provinces of Homburg and Meisenheim; the former of which was bounded by Hesse-Darmstadt, Hesse-Cassel, and Nassau, and the latter by Rhenish Prussia and the Bavarian palatinate; area, 106 square miles. The male line of Hesse-Homburg became extinct by the death of the landgrave Ferdinand Heinrich Friedrich, March 24, 1866; the state was incorporated with Hesse-Darmstadt, and now forms part of Prussian Hesse-Nassau.

Hesse-Nassau (hes'nas'sâ), a province of Prussia, incorporated by decree of Dec. 7, 1868, by the union of the province of Upper Hesse (formerly a portion of the grand-duchy of Hesse) with the former duchy of Nassau; area, 6,060 square miles; pop. (1905) 2,070,052.

Hessenbergite, a monoclinic transparent colorless or bluish mineral of adamantine luster, found imbedded in crystals of hematite at Mount Fibia, W. of the hospice of St. Gotha.

Hessian, a stout coarse cloth made of hemp.

Hessian Boots, a kind of high boots with tassel in front, worn over tight trousers, in fashion with military gentlemen in the 18th century.

Hessian Fly (*Cecidomyia destructor*), a fly of the family *Tipulidæ*, of the order *Diptera* (two-winged flies), the larva of which is very destructive to wheat, barley, and rye crops (it does not attack oats). It is so named from the belief that it was brought over to America by the Hessian mercenaries during the Revolutionary War. The female fly is about ⅛ inch in length, with a wing expanse of about ¼ inch. Its body is brown, with the upper parts, the thorax, and the head of a darker shade, approaching to black. The wings are of a dusky gray, and are surrounded with fringes. The male is somewhat smaller than the female and has longer antennæ. The female flies usually lay their eggs on the young plants twice in the year, in May and September, out of which eggs the maggots hatch in from 4 to 14 days. These work themselves in between the leaf-sheath and the stem, and fix themselves near the lowest joints, often near the root, and suck the juices of the stem, so that the ear falls down at a sharp angle. These

maggots turn to pupæ, from which the flies develop in about 10 days. It has long been a pest in the United States and Germany, but did not appear in Great Britain till the summer of 1886.

Hessians, the inhabitants of Hesse, in Germany. This term was applied to the 20,000 German troops hired by England from the Duke of Brunswick, the Landgrave of Hesse-Cassel, and other petty German princes at the beginning of the American Revolution.

Hessite, an orthorhombic gray sectile mineral of metallic luster. Hardness, 2–3.5; sp. gr. 8.3–8.6. Composition: Tellurium, 37.2; silver, 62.8 = 100. Found in the Altai Mountains in a talcose rock, also in Transylvania and Hungary.

Hestia, one of the later Greek goddesses, equivalent of the Latin Vesta.

Hesus, or **Esus,** a Gaulish war-god corresponding to Mars.

Hesychast (hes'i-kast), one of a singular class of fanatics, who were established in the 15th century, in some of the Greek monasteries of Mount Athos. These Quietists pretended to have attained a perfect interior life of devotional repose by intense contemplation. One of their maxims, apparently derived from some of the strange practices of the Indian ascetics, directs the disciple to "raise his spirit above all vain and transient things, repose his head on his breast, and turn his eyes with his whole power of meditation on his navel." Hence, these visionaries derived the nickname of *Omphalopschoi,* or *Umbilicarii;* they were also termed Thaborites, from their notion respecting a divine light inhabiting the heart of the devotee.

HESTIA.

Hesychius (he-sik'i-us), a Greek grammarian of Alexandria, who flourished probably toward the end of the 4th century A. D. He was the author of a Greek lexicon, containing words and phrases, obscure, rare, and dialectical, which, in spite of the corruption of the text, is one of the most useful books we have for understanding the works of the great classic writers of Greece.

Hesychius, surnamed THE ILLUSTRIOUS, a Greek historical and biographical writer; born in Miletus, Asia Minor; he lived early in the 6th century. He wrote a work on the eminent Greek writers, treating especially of the philosophers, and a universal history from the early days of Assyria down to the year 518 A. D. Only a small portion of this last is extant.

Hetæria, The, a secret society established among modern Greeks, and pledged by a most solemn oath to free the race from Turkish rule. Nearly every Greek who is able to accumulate $100 (the amount of the initiation fee) in a lifetime has been induced to join this society. It had its origin among the Greek refugees in Russia about a century ago. It was said that Czar Alexander I. of Russia was at one time a member of it. The society spread from the refugees to Greece itself. The Greeks flocked to the organization by the thousands, and a Greek prince, Ipsilanti, led the Hetærists in the revolution of 1821. Sultan Mahmoud for the first time became aware that his empire was being honeycombed with this dangerous secret society. He learned that Greeks in the very shadow of his seraglio were members, and he accordingly began to assassinate them by the hundred. He had his interpreter, a learned Greek, put to death, and followed it with the murder of the Greek Patriarch in Constantinople. For this act indignation spread over Greece like wild fire. The Hetærists grew from thousands to hundreds of thousands. Archbishop Germanos hastened to join the society, and in the romantic and beautiful little monastery of Wagaspeleon, April 4, 1821, he unfurled the Hetærist flag over a large following and marched to battle. This tattered and blood stained Hetærist flag was again unfurled in 1897 over the head of Prince Constantine as he left Athens to join his army on the frontier, only however, to be furled again in disastrous defeat. There is not an intelligent Greek today that does not dream that modern Greece will some day be to the world what the country of Pericles and Plato was, and it is due to the teachings of the Hetæria for a century.

Heteradelphia, a double monster, in which the components of the double bodies are very unequal, and of which one portion may be regarded as the stem or trunk, to which another organized part, or even a whole body, less developed than itself, is affixed as a parasite.

Heterocercal, a term introduced by Agassiz to designate the unsymmetrical tail of elasmobranch and most ganoid fishes, in which the vertebral axis is bent upward in the tail, making the upper lobe much the larger. In bony fishes also the axis is somewhat bent upward in its termination, but the asymmetry is disguised, and the tail looks equal-lobed or homocercal. In some teleosteans and ganoids, in a few elas-

mobranchs, and in dipnoi, the tail is genuinely symmetrical or diphycercal.

Heteromerous Lichens, lichens in which the same filaments so ramify as to constitute two distinct layers of tissue, a comparatively thin, usually transparent, but close outer layer or cortex, and an inner, loose, hyphal layer called the medulla, inclosed by the former. Called also stratified lichens.

Heterophagi (-of'a-ji), a name applied to a section or sub-class of birds of which the young, which leave the egg blind, are without feathers, and so helpless that they require to be fed and tended by their parents for some time.

Heteropoda (-op'ō-dä), an order of marine mollusks, the most highly organized of the *Gasteropoda*. In this order the foot is compressed into a vertical muscular lamina, serving for a fin, and the gills, when present, are collected into a mass on the hinder part of the back. The chief genera are *Carinaria* and *Firola*.

Heterotaxia, a malformation, which consists in the general transposition of organs.

Hetman, or **Ataman,** the title of the head (general) of the Cossacks. This dignity was abolished among the Cossacks of the Ukraine by Catharine the Great, and though the Cossacks of the Don still retain their hetman, the former freedom of election is gone, and the title of chief hetman is now held by the Russian heir-apparent to the crown.

Hettner, Hermann Theodor (het'ner), a German historian; born in Leisersdorf, March 12, 1821. He studied at Heidelberg, Berlin, and Halle, and filled professorships at Jena and elsewhere. His masterpiece, published in 1856, "History of Eighteenth-Century Literature," gave him high rank as a philosophical historian. Previously he had made valuable studies on the art of the ancients. He traveled extensively, especially in Greece and Italy. His writings are varied, but all relate to the historical aspects of literature, painting, and sculpture, ancient and modern. He died in Dresden, May 29, 1882.

Hetzel, P. J. See STAHL, P. J.

Heuff, Az Johan Adrian (huhf), a Dutch prose-writer; born in Avezath, March 5, 1843. He abandoned civil engineering for humorous sketch-writing. Under the pseudonym of "J. Huf van Buren" he wrote a number of historical romances, among them "Hertog Adolf"; a Dutch adaptation of the "Pseudolus" of Plautus; and an original comedy entitled "Oom Frederik," and other dramatic pieces. Under the pen-name "Cosinus" he produced a humorous novel, "Kippeveer," wherein certain leaders of the clerical party are ridiculed. He is most successful in satire and caricature.

Heuglin (hoig'lin), **Theodor, Baron von,** a German traveler; born in Hirschlanden, Germany, March 20, 1824. He became first known by his travels in the region of the White Nile and Abyssinia (1854); took part in the German expedition of 1861–1862 to the Egyptian Sudan; and afterward accompanied Mdme. Tinné in her expedition to the Upper Nile. In 1870–1871 he made a journey to the region of Spitzbergen and Nova Zembla, and in 1875 a last journey to the shores of the Red Sea. He published several volumes of African travel and natural history. He died in Stuttgart, Nov. 5, 1876.

Heulandite, a monoclinic, transparent or translucent brittle mineral, of pearly luster, and white, red, gray, or brown color; its hardness, 3.5 to 4; sp. gr. 2.2. Composition: Silica, 58.20 to 59.64; alumina, 15.14 to 17.92; lime, 5.88 to 7.65; soda, 0 to 1.16; potassa, 0 to 2.35; water, 14.33 to 17.48. Occurs chiefly in amygdaloid, though occasionally on gneiss, etc.

Hevelius (hā-fā'lē-ös), real name **Hewel** (hā'vel), or **Hewelke** (hā-vel'ke), **Johannes,** a German astronomer; born in Danzig, Jan. 28, 1611. He was wealthy, and in 1641 he erected an observatory in his own house, and for 40 years carried on astronomical observations therefrom. He wrote descriptions of the phases and spots of the moon, conducted numerous researches on comets, and prepared charts of the moon and of the heavens. He laid down the results of his observations in "Selenography" (1647), "Cometography" (1668), and "The Machine of the Heavens" (1673; reprinted, with an English translation by Prince, in 1882), besides minor works. He died in Danzig, Jan. 28, 1687.

Hevesi, Ludwig (hev'esh-i), a German-Hungarian story-writer and humorist; born in Heves, Hungary, Dec. 20, 1843. He studied medicine at Vienna, and afterward entered a business office; then in 1866 he founded the popular comic sheet "Borsszem Jankó," read by all classes in the Magyar country. He wrote German and Hungarian with equal facility. His humor found its happiest expression in "Rainbows"; "On the Sunny Side"; and above all "Andreas Jelky," a sketch of a journeyman tailor and his amusing adventures in the "four quarters of the world."

Hewit, Nathaniel Augustus, an American Roman Catholic priest and religious writer; born in Fairfield, Conn., in 1820. He had a varied experience, at first as law student, then in turn as Congregational minister, Protestant Episcopal deacon, and Roman Catholic priest; joining under the

religious name of "Augustine Francis" the Paulist order founded by Father Hecker, and becoming professor and superior in the Paulist Seminary, New York. He wrote "Life of Princess Borghese" (1856); "Problems of the Age" (1868); "Light in Darkness" (1871); etc. He died in New York city, July 3, 1897.

Hewitt, Abram Stevens, an American statesman; born in Haverstraw, N. Y., July 31, 1822. He was graduated at Columbia College; was commissioner to the French Exposition of 1867; member of Congress 1875–1879, and 1881–1886; mayor of New York, 1887–1888; secretary of the Cooper Union for the Advancement of Science and Art, New York. He was son-in-law of Peter Cooper, and an authority on iron. He died Jan. 18, 1903.

Hewitt, John Hill, an American ballad and miscellaneous writer; born in New York city, July 11, 1801. His best-known work was the ballad "The Minstrel's Return from the War." He wrote also: "The Governess," a comedy; "Washington," a play; "Shadows on the Wall," a volume of reminiscences; etc. He died in Baltimore, Md., Oct. 7, 1870.

Hewitt, Mrs. Mary. See STEBBINS.

Hexachord, in the ancient music, an interval of four tones and one semitone, equivalent to that which the moderns call a sixth.

Hexagonal System, In crystallography and mineralogy, one of the six great systems of crystallization. It agrees with the tetragonal system in having only the lateral axes equal, but differs in having three equal lateral axes instead of two. The vertical is at right angles to the lateral one. The symmetry of the crystals is by sixes and twelves. The cleavage of biotite, apatite, tourmaline, calc spar, nepheline, and, when it can be effected, quartz, is on the hexagonal system.

Hexahedron, a figure having six faces, or a solid bounded by six planes. The term cube is now generally applied to the regular hexahedron.

Hexameter (-am′e-tur), the heroic verse of the Greeks and Romans. As its name implies, it consists of six feet, properly dactyls, the last of which is shortened by one syllable, and so becomes a trochee, or, as the final syllable is long by position, a spondee.

Hexane, in chemistry, C_6H_{14}, five isomeric hydrocarbons exist. (1) Normal hexane. Dipropyl, $CH_3 \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot CH_3$. It occurs in the light oils obtained by the distillation of cannel coal, also in petroleum. It can be obtained by the action of sodium and normal propyl iodide, C_3H_7I, or by the action of zinc and hydrochloric acid on secondary hexyl iodide (from mannite), and by distilling suberic acid with baryta, $C_8H_{14}O_4 + 2BaO = 2BaCO_3 + C_6H_{14}$. It boils at 71°. (2) Propyl dimethyl methane, or propyl isopropyl, ethyl isobutyl, obtained by the action of sodium on a mixture of ethyl iodide and isobutyl iodide. It boils at 62°. (3) Diisopropyl, $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH\cdot CH\!<\!\!\begin{matrix}CH_3\\CH_3\end{matrix}$ Obtained by the action of sodium on isopropyl iodide. It boils at 58°. (4) Trimethyl ethyl methane, $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!C\!<\!\!\begin{matrix}CH_2CH_3\\CH_3\end{matrix}$ Obtained by the action of zinc methyl on tertiary butyl iodide. It boils at 45°. (5) Methyl diethyl methane, $CH_3CH\!<\!\!\begin{matrix}CH_2\cdot CH_3\\CH_2\cdot CH_3.\end{matrix}$ Not yet obtained.

Hexham, a town of England, in Northumberlandshire, on the Tyne, about 20 miles W. from Newcastle. It has ruins of an abbey church, originally a cruciform structure, built about 674, destroyed two centuries later by the Danes, renovated in 1113, and demolished by the Scots in 1296. THE BATTLE OF HEXHAM, fought May 15, 1464, was one of those belonging to the Wars of the Roses. The Lancastrians under Somerset were defeated by Montague, the former being slain.

Hexoic (-ō′ik), in chemistry, $C_5H_{11} \cdot CO \cdot OH$, fatty acids of the acetic series, containing six carbon atoms. Eight of these acids are possible. (1) The normal hexoic acid is caproic acid. It boils at 205°. (2) Isocaproic acid, isopentylformic acid, is prepared by the action of caustic potash on isopentyl (amyl) cyanide. It boils at 199°. (3) Methyl-isopropyl acetic acid, an oily liquid. (4) Diethyl acetic acid, obtained by the action of sodium and ethyl iodide on methyl acetate. (5) Dimethyl-ethyl, acetic acid, obtained from tertiary butyl cyanide. It boiis at 187°.

Hexyl Alcohols, in chemistry, monatomic alcohols having the formula $C_6H_{13}(OH)$. Seventeen alcohols can exist, eight primary, six secondary, and three tertiary. Normal hexyl-alcohol, $(CH_3 \cdot (CH_2)_4 \cdot CH_2 \cdot OH$. It is obtained from the essential oil of *Heracleum giganteum*, where it exists as hexyl-butyrate, along with octyl-acetic; the oil is saponified by alcoholic potash, and then fractionally distilled. The hexyl-alcohol boils at 157°. By oxidation it yields caproic acid. A secondary alcohol, methyl butyl carbinol, $HO \cdot HC\!<\!\!\begin{matrix}C_4H_9,\\CH_3\end{matrix}$ is obtained by the action of silver-oxide and secondary hexyl-iodide. It boils at 137°. By oxidation it yields acetic, carbonic, and normal butyric acids.

Hexyl Iodide, in chemistry, $C_6H_{13}I$, a secondary hexyl-iodide, is obtained by

treating mannite with strong hydriodic acid. $C_6H_{14}O_6+11HI=5I_2+6H_2O+C_6H_{13}I$. It boils at 167°.

Hey, Wilhelm (hī), a German fable-writer; born near Gotha, March 26, 1789; He was pastor at Töttelstädt and court chaplain at Gotha. His "Fables for Children," published in 1833, had an enormous circulation from their first appearance. He wrote a rhyming "Life of Jesus." He died in Ichtershausen, May 19, 1854.

Heydeck, Karl Wilhelm von (hī'dek) (sometimes called Heidegger), a Bavarian landscape painter; born in Saaralben, Lorraine, in 1788. He entered the military academy at Munich in 1801, and rose to the rank of lieutenant-general. He served as a volunteer in the Peninsular campaign, and took an active part in the Greek war of independence. His pictures are numerous, the more important being preserved at Berlin and Munich. Among them are "Tyrolean Wood-Cutters," "The Lion Gate at Mycenæ," "The Ascent to the Acropolis," etc. He died in Munich, in 1861.

Heyden, Friedrich August von (hī'den), a German poet; born in Nerfken, East Prussia, Sept. 3. 1789. He gave up law and entered the army. Of distinguished family, he was employed in official posts at court in 1843, but fell into disfavor through reluctance to act as a literary censor. His verse is graceful and pleasing. His reputation was made with "Reginald," and "A Woman's Word." "The Intriguers" was a highly successful novel. He died in Breslau, Nov. 5, 1851.

Heyduk, Adolf (hī'duk), a Czech poet; born in Richenburg, June 7, 1835; studied in Prague; traveled through Italy and Germany and became a professor at Pisek. His earlier poetry, beginning in 1859, was of a light order, but his volume "Cymbal and Violin" established his reputation. An idyl of life among his countrymen, "Grandfather's Legacy," and a powerful study in realism, "The Wood-Cutter," are extremely popular.

Heyne, Christian Gottlob (hī'ne), a German scholar; born in Chemnitz, Saxony, Sept. 25, 1729. He was educated at Chemnitz and at Leipsic University, and after a long struggle with poverty he received, in 1763, an invitation to become Professor of Eloquence and Poetry at Göttingen. He was soon after (1764) appointed first librarian, and remained here till his death. He particularly applied himself to classical criticism and the illustration of the writings of the ancients, and published valuable editions of Homer, Pindar, Diodorus Siculus, Epictetus, Vergil, Tibullus, etc., all with full commentaries. He died in Göttingen, Prussia, July 13, 1812.

Heyse, Paul, a German poet and novelist; born in Berlin, where his father was extraordinary Professor of Philology, March 15, 1830. He studied classics in his native city under Lachmann and Boeckh, and in 1850 went to Bonn to attend Diez's lectures on Romance philology. In 1852 he traveled in Switzerland and Italy, and two years later settled in Munich on the invitation of King Maximilian II. of Bavaria, who granted him a pension. He lived mainly in Munich afterward, devoted almost exclusively to literature. His first work was "Jungbrunnen, Märchen eines fahrenden Schülers" ("Tales of a Traveling Scholar"), published in 1850, and to the same year belongs his tragedy "Francesca da Rimini." "Die Brüder" ("The Brothers," 1852) and "Urica" (1852), his next publications, were narrative poems, and formed part of the volume entitled "Hermen" (1854), later "Novellen in Versen," which did much to establish his reputation. Heyse's genius has found its most perfect expression in his numerous tales or novelettes ("Novellen"), and in this department of literature he holds almost a unique place among German writers. His work throughout shows a rich imagination and great fertility in invention. His tales have been published in more than 20 collections, and a selection appeared in three volumes in 1890 under the title "Auswahl fürs Haus" (4th ed. 1895). Some of them, such as "L'Arrabiata" (1870) and "The Romance of the Canoness" (1889), have been translated into English. His early successes in narrative verse have been followed up by such works as: "Die Braut von Cypern" ("The Bride of Cyprus," 1856); "Thekla" (1858); "Rafael" (1863); "Syritha" (1867); "Der Salamander" (1879); "Die Madonna im Olwald" (1879); "Liebeszauber" (1889). His earlier plays, including "Francesca da Rimini," already mentioned, are essentially book tragedies, while those of his next period are somewhat flimsy productions. His best plays are those of his third period, and some of them, especially "Hans Lange" and "Kolberg," have been acted with great success. They include: "Die Hochzeit auf dem Aventin" ("The Wedding on the Aventine," 1886); "Gott schütze mich vor meinen Freunden" ("God protect Me from My Friends," 1888); "Hans Lange" (1866); "Kolberg" (1868); "Die Göttin der Vernunft" ("The Goddess of Reason," 1870); "Die Weiber von Schorndorf" ("The Wives of Schorndorf," 1881); "Das Recht des Stärkern" ("The Right of the Stronger," 1883); "Die Weisheit Salomos" ("The Wisdom of Solomon," 1887); "Weltuntergang" ("The End of the World," 1889); "Die schlimmen Brüder" ("The Wicked Brothers," 1891); "Wahr-

heit?" ("Truth?" 1892); and "Jungfer Justine" (1893). His larger novels, "Kinder der Welt" ("Children of the World," 1873), "Im Paradiese" ("In Paradise," 1875), "Merlin" (1892), and "Uber allen Gipfeln" ("Over all Peaks," 1895), have met with great success. Among the other works of Heyse are his "Skizzenbuch," (1877), partly in verse and partly in prose; "Verse aus Italien" (1880); "Spruchbüchlien" (1885).

Heywood, Thomas, an English dramatist; born in Lincolnshire, England. He lived in the reigns of Elizabeth, James I., and Charles I., and was educated at Cambridge. He composed wholly or in part 220 different plays. Of these only about 24 remain, of which the one most admired is "A Woman Killed with Kindness," published in Dodsley's collection. He was also the author of "Great Britain's Troy," "An Apology for Actors," etc. He died about 1650.

Hezekiah (*Hizkiyah*, generally *Hizkiyahu*, strength of Jehovah), the 12th, and one of the best of the Kings of Judah. He succeeded Ahaz about 726 B. C., when he was 25 years of age, and died about 698 B. C. He had no sooner mounted the throne than he initiated a system of reform, on the injunctions of Isaiah, and broke up the idolatrous customs into which the people had fallen during the life of his father. He also endeavored to repair the injury done by national defeats and losses. So extreme was his indignation against idolatry that he destroyed the brazen serpent which was said to be the one used by Moses in his miraculous healing of the Israelites. To do this required much strength of mind, and a courage equal to defy popular prejudice. Isaiah, the noblest and most eloquent of prophets, confirmed Hezekiah in his faithfulness. With patriotic zeal he assumed the aggressive against the Philistines, and not only rewon the cities lost by his father, but dispossessed them of most of their own. During the siege of Samaria Shalmanezer died, and was succeeded by Sargon, who conducted a futile invasion in the 14th year of Hezekiah's reign.

At this time the King of Judah had a dangerous illness, which threatened serious complications, and the kingdom was in a difficult crisis, for the king had no heir, Manasseh not being born till long afterward. To the king's anguish and prayer Isaiah was ordered to administer comfort and the promise of a fresh lease of life. Much has been written to little purpose about the nature of his malady, the most reliable finding being that it was fever terminating in abscess. Among the ambassadors who came with letters and gifts to congratulate him on his recovery was the viceroy of Babylon, to whom he unfortunately, though from perfectly justifiable motives, displayed the royal treasures. For this he received a terrible rebuke, and he was told by Isaiah that from Babylon would come the ruin and captivity of Judah. The greater part of the Scripture records bearing on the reign of Hezekiah is occupied by the two invasions of Sennacherib, to meet the first of which the King of Judah by presents and entreaties courted the alliance of Egypt, strong in chariots and cavalry, an arm in which Judah was weak, a procedure for which he incurred the censure of Isaiah.

Sennacherib besieged Jerusalem with mounds, and Hezekiah, to rid the country of its enemies, promised 800 talents of silver and 30 of gold. On this Sennacherib marched into Egypt, but his expedition proving futile he made a second invasion of Judah and attacked the stronghold of Lachish. From Lachish he sent an army against Jerusalem and the ministers of Hezekiah were filled with anguish and dismay. The piety of the king was of more avail than arms, and the result of prayer was a prophecy of immediate deliverance. "That night the angel of the Lord went out and smote in the camp of the Assyrians 185,000 men." Among the many conjectures as to the agent of this destruction, the most probable is that it was the pestilence. Several of the Psalms are supposed to allude to the discomfiture of Sennacherib, for example, xlvi., xlviii., lxxvi. Hezekiah did not long survive this deliverance, and after a reign of nearly 29 years he died at the age of 54, and was buried with much pomp amid universal mourning. To him we are indebted for at least one portion of our present canon (Prov. xxv: 1). He was one of the best Kings of Judah. Among the many highly useful works executed by him, the aqueducts of Jerusalem take a foremost place. During his reign was the golden age of prophetic poetry, for in addition to Isaiah there flourished then Nahum and Micah.

Hiawatha (hī-a-wâ'tha), an Indian legendary hero and peacemaker, known by this name among the Iroquois and by other titles among the other tribes of North America. He is mentioned in various works on the aborigines, and in 1855 was immortalized in the beautiful poem, "Hiawatha," by Longfellow. In this he is made to appear as an Ojibway chief.

Hibbert Lectures, an English foundation instituted by the trustees of Robert Hibbert (1770–1849), a West Indian merchant. For many years the trustees applied the funds mainly to the higher culture of students for the Unitarian ministry, but in 1878 resolved to institute Hibbert Lectures, with a view to capable and really honest treatment of unsettled problems in theology, apart from the interest of any particu-

lar church or system. Among the lecturers have been Max Müller, Page Renouf, Renan, Rhys Davids, Kuenen, Beard, Réville, Pfleiderer, Rhys, Sayce, and Hatch.

Hibernation, in zoölogy, that peculiar condition of sleep in which certain animals, chiefly cheiroptera and rodentia, pass the winter season. The bats, the hedgehog and the dormouse are the most striking examples of this phenomenon.

In its most pronounced form hibernation differs physiologically in several important steps from ordinary sleep, though it is undoubtedly linked with this function by a regular chain of links. Cold we know produces drowsiness, which ends in a fatal torpor, and on warm days a sleep steals over the eyes which might, in kind if not in degree, be compared with the æstival torpor of some animals. In other respects, hibernation is more akin to trance. Yet what is most puzzling about it is that it affects only some animals which differ little in habit from others which keep awake all winter, and in the same region find food in abundance. Still, as it enables animals to live within their area which might otherwise require to migrate, we cannot refuse to admit that hibernation plays an important part in the struggle for existence, the survival of the fittest, and the means whereby animals are confined within certain zoögeographical regions. But how it originated, or whether it is a survival, like migration, from a former condition of things, are problems which in the present state of our knowledge cannot be satisfactorily solved.

Hibernators, when they retire for the winter, are unusually fat; when they emerge from their hibernaculum they are unwontedly lean. They all try to keep warm, the heat of their body being nearly that of their hibernaculum. Yet if exposed to greater cold they revive, and, if the temperature is still further lowered, like other animals they freeze to death. During dormancy the animal functions are all but suspended. Respiration and circulation are reduced to a minimum. The air of a closed jar containing a hibernating dormouse is unaltered. Others can survive long in an atmosphere deprived of oxygen. A bat in a lethargic condition has remained 16 minutes under the water. Hibernators lose weight, often to the extent of 30 and 40 per cent., in this respect resembling starving animals.

All reptiles and batrachia become torpid during cold weather, snakes passing the winter in tangled knots as if for warmth; if the viper is aroused at this season its venom is said to be inert. Alligators creep into holes in the riverbanks, and frogs lie dormant in the mud at the bottom of ponds. Many fishes (carp, roach, chub, minnows, eels, the Mediterranean muræna, etc.) also retire into some deep recess, or into the mud, though their condition at this period is not that of the true hibernators. Their vitality only is lowered. In winter all land-snails hibernate by closing the mouths of their shells with a plate (the epiphragm), leaving only a little hole in the middle of it for breathing. Slugs also become torpid in holes in the ground, and the fresh-water mussels (Unio, Anodonta, Dreissena) bury themselves in the pond and river mud till the cold months are over. The torpidity of insects in the pupa and other stages is well known. Individuals belonging to the Vanessa group of butterflies which hibernate in the imago stage occasionally emerge during mild winter days. But hive-bees do not hibernate, food being necessary for their subsistence during the flowerless season.

Hibernia, the ancient name of Ireland, applied to it first by Julius Cæsar. Aristotle mentions this island by the name of Ierne; Pomponius Mela calls it Iverna; Ptolemy, Iuvernia.

Hibiscus, in botany, the typical genus of the malvaceous tribe *Hibisceæ*. The involucel is of several leaves, calyx with five divisions, petals five, stamens forming a sheath which incloses the five-branched style. Fruit five-celled, many seeded. They are plants with large, showy flowers, found chiefly, though not exclusively, in tropical countries. In the West Indies *H. arborea* furnishes tenacious fibers, which are made into whips. Those of *H. cannabinus* constitute the *sun* of India, used as a substitute for hemp. *H. syriacus* and *H. rosa sinensis* are ornamental; the astringent plants of the latter are used by the Chinese to blacken their eyebrows and the leather of their shoes. *H. sabdariffa* and *H. suratensis* are somewhat acid. *H. esculentus* is used in the West Indies, and *H. longifolius* (Ram turai) in the East, for thickening soup. More than 100 species of the genus are known.

Hiccough (hik'up), or **Hiccup,** a series of sudden, rapid, and brief inspirations, followed by expiration accompanied by noise. It is generally caused by irritation of the stomach, but is produced chiefly by the respiratory muscles. In children it sometimes follows a violent fit of crying or sobbing. It also accompanies certain fevers. There is an hysteric hiccough and a hiccough of death.

Hichens, Robert Smythe, an English journalist and novelist; born in Speldhurst, Kent, England, Nov. 14, 1864. Though at the age of 17 he wrote a novel which was actually published, he seems to have been most bent on a musical career; but he wearied of music, and turned to journalism. In 1893 he visited Egypt for his health,

and while there conceived the idea which materialized in the "Imaginative Man" (1895). "The Green Carnation" (1894), however, epigrammatic and keenly satirical in tone, first brought him into public notice, and was followed by "After Tomorrow," and "New Love" (1895); "The Folly of Eustace and Other Stories" (1896); "Flames" (1897); etc.

Hickes, George, an English clergyman, philologist, and antiquary; born in Newsham, near Thirsk, Yorkshire, England, June 30, 1642. He became Dean of Worcester in 1683, but of this he was deprived in 1690 for refusing to take the oath to William III. after the Revolution. He followed the fortunes of James II., and was consecrated suffragan Bishop of Thetford in 1694 by the non-juring Archbishop Sancroft. He wrote: "Institutes of Anglo-Saxon and Mœso-Gothic Grammar" (1689); "Treasury, etc., of Northern Ancient Languages" (1705), etc. He died Dec. 15, 1715.

Hickory, in botany and commerce, the several species *Carya,* a genus of *Juglandaceæ. C. alba* is the shell-bark, scaly-bark, or shag-bark hickory, from the tendency of the bark to peel off in long, loose strips. Its wood is noted for its elasticity and toughness. It is a large tree, sometimes 80 or 90 feet high, by 2 feet in diameter, growing in this country from South Carolina to New Hampshire. The leaves, which are about 20 inches long, are pinnate, leaflets five serrate. The nuts, which are whitish, are sub-globular, pointed at each end. Other species of the genus are the mocker-nut, white-heart, or common hickory (*C. tomentosa*), the wood of which is excellent for mechanical purposes, or for burning, the bitter-nut or swamp hickory (*C. amara*), the pig-nut hickory, or hog-nut or broom hickory (*C. porcina*), the nutmeg hickory (*C. myristicæformis*), etc. The hickory of New South Wales is *Eucalyptus stuartiana* and *E. resinifera.*

Hicks, Elias, an American clergyman; born in Hempstead, N. Y., March 19, 1748; began his ministry among the Quakers in 1775 and devoted himself untiringly to his work for over 50 years without any compensation. He was an active abolitionist and in company with others was instrumental in inducing the State of New York to pass an act which, on July 4, 1827, liberated all slaves within its borders. His doctrinal views, which were not acceptable to many Quakers, led to a disruption of the society, and a body adhering to his teachings was organized under the name of "Hicksites." His publications include "Observations on Slavery" (1811); "The Letters of Elias Hicks" (1834); etc. He died in Jericho, N. Y., Feb. 27, 1830.

Hidalgo (ē-däl'gō), a Spanish nobleman of the lower class. There were *hidalgos de naturaleza,* of noble birth, and *hidalgos de privilegio, i. e.,* those on whom the king had conferred nobility, and those who purchased nobility. The title is now obsolete.

Hidden Island. See LOST ISLAND.

Hide, in old English law, a certain area of land, the exact quantity of which is variously given as 60, 80, and 100 acres. According to R. W. Eyton ("Key to Domesday," 1877), the Domesday hide of land denoted fiscal value, not superficial quantity.

Hides, the skins of animals, either raw or dressed; but the name is more commonly given to the undressed skins of the larger domestic animals, as oxen, horses, etc., the smaller being called skins. The hide trade is now an important one.

Hiel, Emanuel (hēl), a Flemish poet; born in St. Gillis, Dendermonde, May 30, 1834. He was Professor of Rhetoric and Music in the Industrial Institute at Brussels. He was prominent in political reform movements, those of his poems which are not of a sentimental order relating mainly to such themes. His beautiful poem, "The Wind" won a prize, while "Lucifer" and "The Scheldt" rank high in popular esteem. His poems for children, oratorios, and dramatic compositions are especially notable. He died in 1899.

Hielmite (hē-el'mīt), a black mineral of metallic luster and granular fracture; hardness, 5; sp. gr., 5.82. Composition: Tantalic acid, 62.42; oxide of tin, 6.56; protoxide of uranium, 4.87; protoxide of iron, 8.06; protoxide of manganese, 3.32. Yttria = 5.19; lime, 4.26; and water, 3.26, etc. It is a stanno-tantalate of iron, uranium, and yttria, occurring in pegmatite near Fahlum, in Sweden.

Hieracians (-ā'si-anz), or **Hieracites** (hī'ur-a-sītz), the followers of Hierax, Bishop of Leontopolis, a book-copyer, who flourished toward the close of the 3d century. He believed that Jesus promulgated a law much more strict than that of Moses. Those Christians, therefore, who aspired after the highest attainments, were enjoined to abstain from marriage, flesh, wine, etc. He also allegorized Scripture, denied the resurrection of the body, and excluded those who died infants from the kingdom of heaven.

Hieracium, the hawkweeds, a genus of plants, order *Asteraceæ.* They are perennial herbs, with leaves alternate, entire, or toothed; involucre more or less imbricated, ovoid, many-flowered; scales very unequal. *H. Canadense, H. venosum,* and *H. paniculatum,* are American species. *H. murorum,*

the golden-lungwort, or wall-hawkweed, is a native of Europe.

Hiera Picra (hī'e-rä pik'rä), "Holy Bitter," a warm cathartic composed of aloes and canella bark made into a powder and mixed with honey, still a favorite in domestic medicine and veterinary practice.

Hierapolis (-rap'ō-lis), a city of Phrygia, near the junction of the rivers Lycus and Meander, celebrated for its warm springs, and its cave Plutonium, from which arose a mephitic vapor which was poisonous to all but the priests of Cybele. A Christian Church was early established here, and St. Paul mentions it (Col. iv: 12, 13). The city is now desolate, but its ruins still exhibit many traces of its ancient splendor. Also a city of Syria, called Bambyce by the early natives, one of the chief seats of the worship of Astarte or Ashtoreth.

Hierarchy, sacred government, sometimes used to denote the internal government of a Church, sometimes the dominion of the Church over the State. In the former sense hierarchy arose with the establishment of the Christian Church as an independent society. Though elders, called presbyters, stood at the head of the earliest congregations of Christians, their constitution was democratic, each of the members having a part in all the concerns of the association. The government of the congregations was gradually transferred into the hands of their officers, as was natural when the congregations had become societies of great extent. In the 2d century the bishops acquired a superiority over the presbyters, and became the supreme officers of the congregations, although the presbyters retained some share in the government. The bishops in the capitals of the provinces, who were called metropolitans, soon acquired a superiority over the provincial bishops and exercised a supervision over them. They were themselves subject to the bishops of the principal cities of the Roman empire, Constantinople, Antioch, Alexandria, and Jerusalem, who received the title of patriarchs; and thus a complete aristocratic constitution was formed, which continued in the Greek Church, while, in the Latin, the aristocracy was transformed into a monarchy. The Roman bishop acquired the primacy over the others, and the opinion having become prevalent that the apostle Peter had founded the Roman Church and that its bishop was his successor, his authority constantly increased, and he gradually became a monarchical head of Western Christendom.

The word hierarchy is frequently used in the second sense, viz., of the relations of the Church to the State, in which the Church is not only independent of the State, but even claims a superiority over it. In the first centuries the Church had no connection with the State. It did not seek to acquire influence over the State, and the State sometimes persecuted the Christian religion. After the Church was amalgamated with the State, in the time of Constantine the Great, it obtained protection, but was dependent on the temporal rulers, who asserted the right to convoke the general councils, and to nominate the metropolitan bishops, and even frequently interfered in the internal affairs of the Church and its dogmatic discussions. It was the same in the Gothic, Lombard, and Frankish States, which were erected on the ruins of the Roman empire. The German emperors, and especially Charlemagne, also exercised over the Church the rights of sovereignty which the Roman emperors had possessed; and after the feudal system had arisen in the German empire the bishops held the Church lands as fiefs received from the temporal princes; and even the Roman bishop, in his temporal character, stood in a feudal relation to the Frankish princes. But the germ of the hierarchical system already existed at this period in the idea of the Church as a society always enlightened by the Divine Spirit, and in the idea, borrowed from Judaism, of a priesthood instituted by God himself, by which the clergy acquired dignity surpassing all temporal grandeur, and an authority emanating not from the State, but from God himself.

But the hierarchical system could not be completely developed from these germs till the Roman bishop became the undisputed head of Western Christendom, by which unity and strength were infused into the exertions of the spiritual power. For several centuries the importance of the Roman bishop continued to increase; his power was especially augmented in the 9th century, by the Pseudo-Isidorian collection of canons, some forged, some interpolated, the object of which was to exalt the ecclesiastical authority above the secular. Gregory VII. exerted the most undaunted courage and liveliest zeal in the 11th century to enforce the claims of the hierarchy; and the principal means which he adopted for attaining this object were, to deprive the princes of the right of investiture, and to introduce celibacy among the clergy. Gregory did not wholly accomplish his object; but his successors pursued his plan with perseverance and success, and their efforts were favored by the Crusades, which were undertaken at the close of the 11th century, and prosecuted for two centuries. These wars promoted a tone of public sentiment favorable to the claims of the Church, and as they were deemed of a religious character, they afforded the Popes numerous opportunities to take part in the general affairs of the European nations, and to direct the undertakings of the princes.

Amid these wars was developed the idea of the unity of the Christian Church, with the vicar of Christ at its head.

Thus, from the end of the 11th to the middle of the 13th century the idea of a hierarchy was accomplished. The Church became an institution elevated above the State, and its head, endowed with a supernatural fullness of grace, stood, in public opinion, above all secular princes, in their disputes with whom the Popes were generally victorious. Urban II., Paschal II., and Innocent III. and IV., in particular, knew how to maintain their superiority over the princes, and to exercise a powerful influence on the affairs of the European nations. The Popes were no more ambitious than the princes, and only acted in conformity with their character and relations, when they attempted to render the Church independent of the political power, and to elevate it above the State. Since the hierarchy rested on public opinion, it was necessary for it to preserve this public opinion by every means and to suppress whatever threatened to change it. It therefore exerted a pernicious influence by establishing inquisitions and restricting the freedom of the mind. But, on the other hand, it was in early times productive of much good, by serving as a point of union to the European nations; by constituting a balance to the military and political power; by frequently composing the differences of the princes, checking the outbreak of wars, and giving religion an influence over the barbarous nations of the Middle Ages.

From the 14th century the papacy, and with it the hierarchy, began gradually to decline. This was manifested by the disputes of the Popes with Philip the Fair and Louis the Bavarian, which did not terminate to their advantage, as had been the case before. To this must be added the removal of the Popes to Avignon, and the great schism which resulted in the councils of Pisa (1409), Constance (1414), and Basel (1431), where the Popes appeared as parties before a higher tribunal, and it was proclaimed that the councils are superior to the Popes. But what was of yet greater importance, public opinion gradually began to alter; and in many places the doubts started by Wyclif and Huss found adherents. Meanwhile the popedom and the hierarchical system stood uninjured in its outward forms till the beginning of the 16th century. But at this time the edifice, already tottering. was vehemently agitated by the Reformation. In that portion of Western Christendom which separated from Rome the hierarchy altogether ceased. The Catholic Church continued, indeed, even after the Reformation to assert its hierarchical pretensions, but it was obliged to renounce one privilege after another; the papal power declined, and in practice became more and more dependent on the civil authorities. However the term hierarchy is still in common use to denote the governing and ministering body in the Church according to its several gradations. Strictly it can be applied only to those churches which are ruled by bishops, such as the Roman Catholic Church and the Anglican Church, which also holds the theory of a hierarchical gradation of rank and authority. Both the Churches named comprise the three orders of bishops, priests, and deacons. Those Lutheran communities which still retain the title of bishops, concede so little of independent jurisdiction to the office, that the gradations in the ministry can scarcely be regarded as having a strict hierarchical character.

Hierarchy is also used to denote a division of the angels, prevalent in the Middle Ages. An account of the opinions on this subject may be found in the "Celestial Hierarchy," a work erroneously ascribed to Dionysius the Areopagite. The number of hierarchies was three, each subdivided into three orders: hence Tasso marshals his angels in three squadrons, and each squadron in three orders, and Spencer repeatedly mentions the "trinal triplicities." The first hierarchy consisted of cherubim, seraphim, and thrones; the second, of dominions, virtues, and powers; and the third of principalities, angels, and archangels. Milton, to whose machinery in his divine poem many of the popular opinions on the subject may be traced, often alludes to this classification; as for instance,

> "Thrones, denominations, princedoms, virtues, powers,
> Hear my decree."

Hiero I., King of Syracuse in Sicily, brother and successor of Gelon. On his accession to the throne of Syracuse, Gelon conferred on Hiero the government of Gela, his native place, and on his death left him 478 B. C., a scepter which he had rendered legitimate by his virtues. Hiero's reign, though less glorious than the preceding, was marked by a peculiar splendor on account of his generous encouragement of learning. But the recollection of his predecessor, whose memory was highly revered, exposed the faults of Hiero in a strong light in the beginning of his reign, when he behaved in a tyrannical manner. Dazzled by greatness, corrupted by flattery, and suspicious in the extreme, Hiero at first encouraged spies, and surrounded himself with foreigners and mercenaries, fearing a rival in every one more virtuous and able than himself. His brother Polyzelus was particularly an object of his jealousy, and wishing to get rid of him, he gave him the command of the troops sent to aid the town of Sybaris against Croton. But Polyzelus, penetrating his intentions, fled to the court of his father-in-law, Theron, King

of Agrigentum. The protection that he enjoyed here was the cause of a war, which Hiero terminated by doing a service to his enemy. The inhabitants of Himera had been governed tyrannically by Thrasydæus, son of Theron. Wearied with oppression, they proposed to Hiero to deliver him their city. The King of Syracuse informed Theron of it, who in consequence made a proposal to terminate the differences existing between them by a permanent peace. Hiero received the sister of the King of Agrigentum in marriage, and Polyzelus was restored to his brother's favor.

Without manifesting military talents, Hiero ended with success all the wars which he was obliged to undertake. He expelled the inhabitants of Naxos and Catana, peopled both cities with a new colony, gave the latter a new name, Ætna, and, as its founder, took the surname Ætnæus. Though some blemishes tarnished the first years of Hiero's reign, he compensated for his first faults by the noble actions which signalized the remainder of his life. A long sickness which befell him was the main cause of this alteration. Since he could no longer occupy himself with the cares of royalty, he collected around him a society of learned men, and thus becoming acquainted with the pleasures of learning, he never afterward ceased to value it. His court became the rendezvous of the most distinguished men of his time. The names of Simonides and Pindar appear among those of his most constant companions, and when Æschylus left Greece, he betook himself to Hiero, to close his days in his kingdom. Bacchylides, Epicharmus, and Simonides were likewise residents at his court. Xenophon would not, in his dialogue on the qualities of kings, have placed words in the mouths of Hiero and Simonides in contradiction with their actions; and the title Hiero, which he gives to his book, contains the finest eulogium of this monarch. According to Ælian and Pindar, few princes were to be compared with him. He was several times victor in the Grecian games. Pindar has celebrated his victories; several odes of this poet are filled with his praises. Hiero died in Catana, 467 B. C.

Hiero II., King of Syracuse; born about 307 B. C. He was a son of Hierocles, a noble Syracusan, who claimed a descent from the family of Gelon. He was chosen by the soldiers as general in 275 B. C., and recognized as king about 270. In 264 he made an alliance with the Carthaginians against Rome, and thus began the first Punic war. Being defeated by the Romans he made peace by the payment of tribute, and was ever after a faithful and useful ally to them. His subjects enjoyed great prosperity during his reign. The encouragement which he extended to agriculture enriched him and doubled the revenues of the State. He kept his word pledged to his allies, and when the Romans underwent a total defeat from Hannibal at Thrasymene, Hiero proffered them provisions, men, and arms, and sent them a golden statue of Victory, 320 pounds in weight, which they accepted as a happy augury. This kind attention consolidated the league between Rome and Syracuse; and even the loss of the battle of Cannæ, which was followed by the defection of all the other allies of Rome, did not shake his fidelity. Hiero devoted himself to the construction of military machines of all kinds, under the direction of the great Archimedes. With the intention of surpassing the magnificence of all other kings, he built a ship, which had never been equaled for magnitude and splendor, and from the description of it, preserved in Athenæus, it must have resembled a floating city. But it being discovered that Sicily had no harbor adequate to the reception of this immense structure, Hiero resolved to make a present of it to King Ptolemy; and as Egypt was at that time in want of corn, took this opportunity to send a great supply of grain to Alexandria. Hiero died 215 B. C.

Hierochloa (-rok'lō-ä), the holy grasses, a genus of plants, order *Graminaceæ*. *H. borealis*, the holy or Seneca grass, is a grass about a foot high, with a brownish glossy lax panicle. It is found in the N. of Europe, and in America from Virginia up to the Arctic regions. It has a sweet smell, like that of vernal grass; and in Iceland, where it is plentiful, is is used for scenting apartments and clothes. In some countries it is strewed on the floors of places of worship on festival days, whence its name, and that of the genus.

Hierocles (-er'ō-klēz), the name of several Greeks: (1) A Professor of Rhetoric at Alabanda, Caria; he is said to have excelled in what Cicero called "the Asiatic" style of eloquence. Lived in the 1st century before the Christian era. (2) A writer on the veterinary art, of whose work three chapters have been preserved. (3) A Stoic philosopher, who is said to have flourished about the time of Hadrian. (4) A writer of a work, which, under the title of "Traveling Companion," gave a description of the provinces of the Eastern empire. This work was edited and printed by Wesseling, at Amsterdam, in 1735. He is supposed to have lived in the 6th century. (5) A persecutor of the Christians, who was president of Bithynia, and afterward governor of Alexandria, where he committed numberless cruelties. He wrote some books against the Christians, mentioned by Lactantius and Eusebius. The remains of his writings were published by Bishop Pearson in 1654, with a curious discourse on them. Lived in the 4th century.

(6) An Alexandrine Platonic philosopher, who wrote seven books on Providence and Destiny, and a commentary on the Golden Verses of Pythagoras; the latter of which is extant, also fragments of the former. Lived in the 5th century.

Hieroglyphic (-glif'ik), in ordinary language, written in characters difficult to decipher. Hieroglyphics or hieroglyphs are representations of animals, plants, and other more or less material bodies, sculptured on Egyptian temples, obelisks, sarcophagi, etc., and designed for ideographic or other writings. Hieroglyphics are of two kinds: some are IDEOGRAPHS (*q. v.*), others stand for syllables or for letters. They are not confined to Egypt; they exist in the adjacent lands, and in Mexico. Professor Sayce shows that there were some hieroglyphics in the Hamathite inscriptions which were probably of Hittite origin. The Mexican hieroglyphics emanated from the ancient Aztecs. Hieroglyphs are a shorter kind of picture writing, which it is thought was the earliest form of all. Hieroglyphics were ultimately modified into alphabetic writing. Thus the Rev. W. Houghton believed in the hieroglyphic or picture origin of the Assyrian Syllabary, and Endlicher has shown that the "ancient pictures" of the Chinese gave rise to the cursive forms now in use.

Hieromnemon (-nē'mŏn), in Greek history, the title of one of the two deputies sent to the meetings of the Amphictyonic Council by each tribe forming that confederacy. His office was, as the name imports, to superintend the religious rites on the occasion. It also, in some of the Greek states, denoted a priest, and also a magistrate.

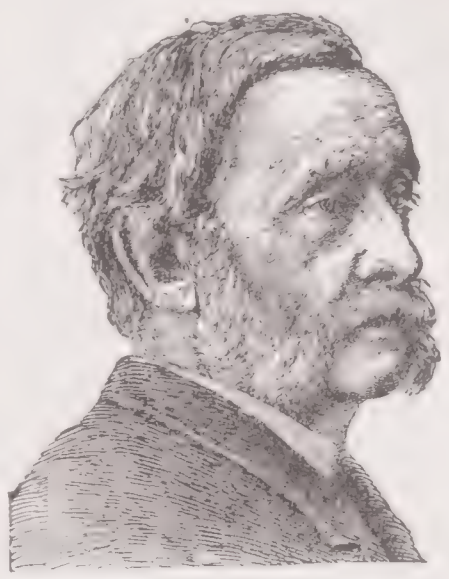
Hieronymites (-on'i-mītz), or **Jeronymites** (je-ron'-), hermits of St. Jerome (Hieronymus), an order of religious persons established in 1374, who wear a white habit with a black scapulary. They possessed the convent of St. Lawrence in the Escurial, and still have convents in Sicily, the West Indies, and South America.

Hieronymus. See JEROME.

Higgins, Matthew James, pseudonym JACOB OMNIUM, an English essayist; born in Benown, County Meath, Ireland, Dec. 4, 1810. He was educated at Eton and Oxford. His intellectual force, his humor and irony were enlisted in the warfare against the abuses and backslidings, minor evils, of social and public life. He was a steady contributor to the "New Monthly Magazine," "Morning Chronicle," "Times," "Cornhill," "Edinburgh Review," "Pall Mall Gazette," etc., some of his articles being afterward collected in book form, "Essays on Social Subjects" (1875). He died near Abingdon, Aug. 14, 1868.

Higginson, Mary Thacher, pseudonym MRS. POTTER, an American author and poet, wife of T. W. Higginson; born in Machias, Me., Nov. 26, 1844. Her works are: "Seashore and Prairie" (1876); "Room for One More" (1879); "Such as They Are" (1893), a volume of poems written in collaboration with her husband.

Higginson, Thomas Wentworth, an American author; born in Cambridge, Mass., Dec. 22, 1823; was graduated at Harvard College in 1841; served in the Civil War as captain in the 51st Massachusetts Volunteer Militia, colonel of the 1st South Carolina Union Volunteers, and colonel of the 33d United States Colored Infantry. His publications include: "Woman and Her Wishes"; "Sympathy of Religions"; "Young Folks' History of the United States"; "Young Folks' Book of American Explorers"; "English History for Americans"; "Cheerful Yesterdays"; "Contemporaries"; "Old Cambridge"; etc.



THOMAS W. HIGGINSON.

Highbinders, the name given by Americans to a secret organization known to exist among the Chinamen in North America, and which has caused considerable disturbance in the Chinese population of San Francisco, Cal., necessitating intervention on the part of the authorities. The Chinese call these societies *pro tan ocy* or "hatchet" societies, and the members "hatchet boys." The organization seems to be an offshoot of the SIX COMPANIES (*q. v.*), though some claim that it is merely a revival of one which originated over 200 years ago in China. The members claim to be Chinese Freemasons, but seem in reality to be lawless spirits unable to brook the discipline of the regular charitable societies, and who have consequently organized for mutual protection in crime, for police purposes, and for blackmail, especially the last. Murder they consider a legitimate means of intimidation or revenge, and the coolie whose death has been decreed by a highbinder society has never been known to escape the hatchet boy or boys appointed for his doom.

High Church, one of the three great parties in the English Church. They regard the Episcopal form of government as so essential to a true church that, as a

rule, they do not feel free to recognize, as sister churches, those Christian denominations which are under other forms of government. During the 19th century High-churchism developed first into Tractarianism and then into Ritualism. Believing the Church to have received the right of autonomy from its Divine Head, the High-church party feel galled by the Royal Supremacy, and dispute the right of the civil courts to try ecclesiastical cases.

High German, originally the Teutonic dialect spoken in the S. and elevated parts of Germany, as distinguished from Platt Deutsch or Low German, spoken in the N. and more lowland portions of Germany. See GERMANY.

Highland Regiments, regiments in the British army originally raised in the Highlands of Scotland. Their origin is found in certain companies of Highlanders armed by government about 1725–1730, for the purpose of keeping order in the Highlands, and called the "Black Watch," from the somber colors of their tartans. These were embodied as a regiment of the regular army in 1739, the first Highland regiment being the 43d, afterward the 42d, which has borne a distinguished part in almost all the wars in which Great Britain has been engaged. Seven other regiments were raised at different times. Each regiment has its own distinctive tartan, some retain the kilt, others wear trousers. Several Highland volunteer regiments are brigaded with this corps.

Highlands of Scotland, The, a somewhat vague and indefinite geographical division of Scotland, N. and W. of a line running N. E. from Dumbarton on the Clyde through the counties of Dumbarton, Stirling, Perth, Forfar, Kincardine; then N. W. through Aberdeen, Banff, Moray, and Nairn to the shores of the Moray Firth. The Highlands are generally subdivided into two parts, the West Highlands and the North Highlands; the former of which contains the shires of Argyll and Bute, the Southern Hebrides, and part of Perth and Dumbarton; the latter comprehends the counties of Inverness, Ross Sutherland, the districts of Athol, Rannoch, and the Isles of Skye, Lewis, and others belonging to Inverness and Ross. The mountainous parts of Banff, Moray, Aberdeen, and Kincardine are also recognized as forming part of the Highlands; while Caithness (partly) and the Orkney and Shetland Isles are excluded, because their inhabitants are of Scandinavian origin. The whole of the district, which embraces the Celtic-speaking part of Scotland, is wild, rugged, and mountainous, with much grand and picturesque scenery. The W. coast is indented by many narrow arms of the sea, and is flanked by numerous islands. Forming, by their natural characteristics, a region distinct from the Lowlands of Scotland, the Highlands were long in a state of political semi-independence, and socially and otherwise — and particularly in retaining the use of the Gaelic tongue — the people have still certain characteristics peculiar to themselves. What especially separated this region from the rest of Scotland was not only the Celtic language and blood, but also the clan system and all connected with it.

In the earliest times the Highland chiefs gave allegiance to higher chiefs or princes, by whom the Scottish kings were acknowledged as sovereigns merely in name. In the early part of the 15th century the Highlanders threatened to overrun great part of the Lowlands but they received a check in the defeat of Donald of the Isles at Harlaw in 1411. From this time onward their incursions on the Lowland parts of Scotland were confined chiefly to occasional plundering raids. In the wars of the 17th century the Highlanders were largely engaged on the side of the Stuarts, and great numbers fought under both Montrose and Dundee. After the suppression of the rising of 1715 a strenuous attempt was made to break up the tribal organization of the Highlanders. A stringent law for disarming the people was passed, and they were even prohibited from wearing their national dress, a prohibition not formally removed till 1782. The Highland dress, so well known at the present day, is modern in a good many of its features, and especially so in the great variety of tartans that have been invented, and of which each clan now appears to claim one. In 1881 there were 231,549 persons in Scotland speaking Gaelic regularly.

Highness, a title of honor given to princes or other persons of rank, used with the possessive pronouns "his," "her," etc., and with the addition of "royal," "imperial," "serene," applied to the members of royal, imperial, and some German sovereign families.

High-pressure, operated by a large measure of force of some sort. A high-pressure alarm in a steam engine is an alarm intended to give notice of a dangerous head of steam, and to prevent an explosion of a steam generator. It consists mainly of two classes: (1) Fusible plugs in the side of the boiler, which give way when a certain heat is attained, and allow the steam to escape. (2) Valves which open when the pressure becomes excessive, and allow exit to steam, which blows an alarm whistle. A high-pressure engine is a steam engine, condensing or non-condensing, in which the safety-valve is loaded (United States) with a weight equivalent to a boiler-pressure of 35 pounds to the square inch. The term "high-pressure" has a very indefinite signi-

fication; condensing engines are often called "low-pressure," and non-condensing engines "high-pressure," but the question of condensing is not necessarily one of pressure.

High Priest, the chief priest in any faith, he who occupies the highest place in the hierarchy, as the Pontifex Maximus among the Romans. In Judaism, the divinely-appointed head of the Jewish hierarchy. The first to hold the office was Aaron, whose pontifical vestments and their adornments were to include a breast-plate, an ephod, a robe, a broidered coat, a miter, and a girdle. The girdle was to be of gold, blue, purple, scarlet, and fine twined linen, and was to have on it two onyx stones, each of them containing the names of six of the 12 tribes. The office was to descend lineally in his family. The high priests were to be without blemish, were to avoid eating things which died of themselves, or marrying a widow or a divorced person. They were not to make mourning for private or domestic sorrows. They were to take the most important and solemn parts of the worship (Exod. xxviii, xxix.). (See HOLY OF HOLIES.) The Romans were afraid of the influence likely to be acquired by so exalted a spiritual functionary and apparently appointed a new one every year (John xviii: 13).

High Seas, the open sea or ocean. The claims of various nations to exclusive rights and superiority over extensive tracts of the ocean highway have been settled after much controversy by a general international law. The principle now accepted is that the jurisdiction of maritime states extends only for 3 miles, or within cannon range of their own coasts; the remainder of the seas being high seas, accessible on equal terms to all nations. Inland seas and estuaries, of course, are excepted.

High Steward, in Great Britain, a title given to several important officers. The peer appointed by the crown to preside at the trial of a peer or peeress for treason or felony is called the Lord High Steward; and there is a permanent officer of the royal household who bears the same designation. The universities of Oxford and Cambridge have each a high steward, whose duty it is to assert and protect the privileges of the university courts.

Highwaymen, robbers who attack passengers on the public road; those who rob on foot being further distinguished as footpads. Famous English highwaymen were Claude Duval (1643–1670), Swift Nick Nevison (hanged at York in 1684), Dick Turpin (1705–1739) and his comrade Tom King, and Jerry Abershaw (1773–1795). Turpin's famous ride to York is a myth, based on a story told of Nevison. The best-known English romances of the road are W. H. Ainsworth's "Rookwood" and Lord Lytton's "Paul Clifford." In the W. of the United States highwaymen are called road-agents, among the most prominent of whom were the notorious James family.

Hilaire, Emile Marc. See SAINT HILAIRE, MARCO DE.

Hilarion (hi-lā′ri-on), founder of the monastic system in Palestine; born in Tabatha, near Gaza, Palestine, about 290. He was educated at Alexandria, and converted to the monastic system by St. Anthony. He then lived as a hermit in the desert between Gaza and Egypt for many years, and finally died in Cypress in 372. His memory is celebrated Oct. 21.

Hilary, St. (hil′a-ri), one of the early fathers of the church; born probably in Poitiers. After his conversion from heathenism, he became bishop of Poitiers about 350. His contests with the Arians caused his banishment to Phrygia, whence he returned after some years, and continued to distinguish himself as an active diocesan till his death in 367 or 368.

Hilda, St., an English abbess; born in the West Riding of Yorkshire, England, in 614. She was daughter of Hereric, a nephew of Edwin of Northumbria, and was baptized at 14 by Paulinus. Recalled by Bishop Aidan from her retreat in a French monastery, she became abbess of Heorta or Hartlepool in 649. In the year 657 she founded the famous monastery at Streoneshalh or Whitby, a double house for nuns and monks, over which she ruled with remarkable wisdom for 22 years. Her effigy still stands on the ancient seal of Hartlepool, and churches preserve her name both there and at South Shields. She died in Whitby, England, Nov. 17, 680.

Hildebrand, King of the Lombards. He ascended the throne in 736, and shared power with his uncle Luitprand; but his tyranny became insupportable to his subjects, who deposed him in 744, electing in his stead the Duke of Friuli.

Hildesheim (hil′des-hīm), a city of Prussia, in Hanover, 16 miles S. E. of Hanover. Manufactures linen cloths and yarn. It has a splendid Gothic cathedral, built in the 11th century, with bronze gates 16 feet high. Pop. (1905) 47,060.

Hildreth, Charles Lotin, an American author; born in New York city, Aug. 28, 1856. He served on the staff of the New York "World" and later on "Belford's Magazine." Among his works are: "Judith" (1876); "The New Symphony and Other Stories" (1878); and the "Masque of Death and Other Poems" (1889). He died in 1896.

Hildreth, Richard, an American historian; born in Deerfield, Mass., June 22, 1807. He first became known as a miscel-

laneous prose-writer and political journalist. The "History of the United States" is his greatest work, covering the period from the discovery of America to the end of President Monroe's first administration (6 vols. 1849-1856). Among his other works are: "The Slave, or a Memoir of Archy Moore" (1837)—an anti-slavery romance; "History of Banks" (1837); "Theory of Morals" (1844); "Theory of Politics" (1853); and "Atrocious Judges as Tools of Tyrants" (1856), compiled for political purposes from Lord Campbell's "Lives of the Chief Justices." In 1861 he went to Austria as United States consul at Trieste. He died in Florence, Italy, July 11, 1865.

Hiles, Henry, an English organist, composer, and author; born in Shrewsbury, England, Dec. 31, 1826. He was a lecturer on harmony and musical composition at Owens College, Manchester, professor of harmony at the Royal Manchester College of Music, and the author of standard theoretical works, such as "The Harmony of Sounds" (1872); "The Grammar of Music" (1870); "Part-Writing, or Modern Counterpoint" (1884). He died Oct. 20, 1905.

Hill, Agnes (Leonard) (pseudonym, MOLLIE MYRTLE), an American novelist; born in Louisville, Ky., Jan. 20, 1842. She wrote "Myrtle Blossoms" (1863); "Vanquished" (1866), a novel; "Heights and Depths" (1871); "Hints on How to Talk" (1891); "What Makes Social Leadership" (1892); "Said Confidentially" (1902).

Hill, Ambrose Powell, an American military officer; born in Culpeper co., Va., Nov. 9, 1825; was graduated at the United States Military Academy in 1847; served in the Mexican War; resigned from the National army in March, 1861, and was made colonel of the Thirteenth Virginia regiment. Promoted major-general in May, 1862, he greatly distinguished himself in numerous battles, in recognition of which he was promoted lieutenant-general, May 20, 1863, and was placed in command of one of the three corps into which Lee's army was at that time divided. He led his corps at Gettysburg and later at Bristow Station, and with Longstreet checked the assault on the Weldon railroad in 1864. He was killed in front of Petersburg, Va., April 2, 1865.

Hill, Benjamin Harvey, an American legislator; born in Jasper co., Ga., Sept. 14, 1823. He was graduated at the State University of Georgia in 1844, and the next year was admitted to the bar. In 1851 he was elected as a Whig to the lower house of the legislature of his State, and in 1859 to the State senate. As a Unionist member of the State secession convention that met at Milledgeville, Jan. 16, 1861, he vainly opposed the measures for severance from the Union, but finally yielded and was elected a member of the provisional Confederate congress the same year. Soon afterwards he was promoted to the Confederate senate (see CONFEDERATE STATES OF AMERICA). He was confined as a prisoner of war in May-July, 1865, in Fort Lafayette, New York harbor. Becoming an ardent Democrat after the end of the Civil War, he denounced the reconstruction measures of the Republican party, and his "Notes on the Situation" (1867-68), embodying his views, attracted wide attention. In 1872 he supported Horace Greeley for President, and the following year was defeated for the United States Senate. In 1875 he was elected to the House of Representatives from the ninth district, and during the next year was given a seat in the Senate, which he held until his death. As an orator and constitutional lawyer his reputation was deservedly high. Some of his finest speeches, such as that denouncing Mahone's coalition with the Republicans, were delivered in the Senate. He died in Atlanta, Aug. 16, 1882 (see also GEORGIA). Consult: Hill, "The Life, Speeches, and Writings of Benjamin Harvey Hill" (1891).

Hill, Daniel Harvey, an American military officer; born in Hill's Iron Works, York district, S. C., July 12, 1821; was graduated at the United States Military Academy in 1842; served in the Mexican War; became professor of mathematics and military tactics in Washington College, Virginia, in 1849; professor of mathematics in Davidson College, North Carolina, in 1854; president of the North Carolina Military Institute at Charlotte in 1859. In 1861 he resigned to enter the Confederate army as colonel. He rendered important service in September, 1862, was promoted to lieutenant-general in 1863, and commanded a corps at the battle of Chickamauga. In 1877-84 he was president of the Arkansas Industrial University, and in 1885-89 of the Middle Georgia Military and Agricultural College. He died in Charlotte, Sept. 24, 1889.

Hill, David Bennett, an American lawyer; born in Havana, N. Y., Aug. 29, 1843. He studied law, and was admitted to practice in 1864; elected to the State Assembly in 1870-1871; and in 1882 chosen lieutenant-governor of his State, succeeding Cleveland as governor when the latter assumed the presidency. In 1885 he was renominated for the governorship by the Democracy and elected. In 1888 he was again nominated and reëlected. In 1891 he was chosen United States senator. He was a prominent though unsuccessful candidate for the presidential nomination in the Democratic national convention of 1892, and in 1894 was defeated for governor of New York State by Levi P. Morton. In 1902 he practically dominated the Democratic State convention, and was active all through the campaign. He died Oct. 20, 1910.

Hill, David Jayne, an American diplomat; born in Plainfield, N. J., June 10, 1850; president of Bucknell University, 1879-1888, of Rochester University, 1888-1896; assistant U. S. Secretary of State, 1898-1903; Minister to Switzerland, 1903-1905, to the Netherlands, 1905-1907; Ambassador to Germany from April 2, 1908; member Permanent Council, Hague Tribunal.

Hill, James J., an American railway promoter and official; born near Guelph, Ontario, Canada, Sept. 16, 1838. He entered upon a business career in Minnesota, was in steamboat offices at St. Paul in 1856–65, and later was interested in the general fuel and transportation line. In 1870 he organized the Red River Transportation Company, which opened communication between Winnipeg and St. Paul; and in 1873, the syndicate which obtained control of the St. Paul and Pacific railway. He reorganized this system as the St. Paul, Minneapolis and Manitoba railway, and finally became its president. In 1890 it was incorporated in the Great Northern system, which Hill began to develop in 1883 with the commencement of the construction of the Great Northern railway. The system, with northern and southern branches, connects Puget Sound and Lake Superior, and by means of special steamship connection reaches across the Pacific to China and Japan. Of this system, and of the Northern Securities Company, which he had promoted, Hill became president. His philanthropies include a gift of $500,000 for the establishment of a Roman Catholic Theological Seminary at St. Paul. LL.D. of Yale, 1910.

Hill, Robert Thomas, an American geologist; born in Nashville, Tenn., Aug. 11, 1858; was graduated at Cornell University in 1886, and immediately after leaving college entered the service of the United States Geological Survey. In this capacity he made explorations and studied the problems of the geological history and origin of the land forms of Central America and the West Indies with Prof. Alexander Agassiz. He also was lecturer in the School of Economics of the University of Michigan; and was Professor of Geology in the University of Texas for two years. His most important work, published in 1898, was entitled "Cuba and Porto Rico, with Other Islands of the West Indies." In May, 1902, he was sent by the National Geographical Society at the head of the expedition to investigate the eruption of Mont Pelée.

Hill, Rowland, 1st Viscount Hill, a British soldier; born in Prees, Shropshire, England, Aug. 11, 1772. He entered the army in his 16th year, obtained the rank of captain in 1793, and became colonel of the 90th Regiment in 1800. He took part in the Egyptian campaign, and in 1806 was made Major-General. He served with great distinction during the campaigns of Moore and Wellington in the Peninsula. In 1809 he became Lieutenant-General; in 1812 he was made a K. B.; and in 1814, on being made a peer by the title of Baron of Almarez and of Hawkstone, Parliament voted him a perpetual pension of $10,000. At Waterloo he commanded the right wing of the British, and he was personally thanked by Wellington for his services. In 1828 he was appointed general commanding-in-chief of the British army, a post which he held till 1842, when he retired and was made a viscount. He died in Hardwicke Grange, near Shrewsbury, England, Dec. 10, 1842.

Hill, Sir Rowland, the author of the penny-postage system; born in Kidderminster, England, Dec. 3, 1795. After agitating, for several years, his scheme regarding a reform of the old postal and franking systems, he, in 1842, succeeded in getting it carried into effect. It at once produced great results, and in 1846 the British public presented him with a testimonial valued at $67,000. In 1854 he was made chief secretary of the English Postoffice, and held that position till 1864, when he retired on account of ill-health. In the same year, he was voted a sum of $100,000 by Parliament, the Albert gold medal of the Society of Arts, and the degree of D. C. L. in recognition of the benefits he had conferred on his country. He was also the originator of the money-order system, and of postoffice savings-banks. He was knighted in 1860. He died in Hampstead, near London, Aug. 27, 1879.

Hill, Theophilus Hunter, an American poet; born in Raleigh, N. C., Oct. 31, 1836. He was a lawyer in Raleigh, and State librarian, 1871–1872. He wrote "Hesper and Other Poems" (1861), distinguished as being the first book copyrighted by the Confederate government; "Poems" (1869); "Passion Flower and Other Poems" (1883); etc. He died in 1901.

Hill, Thomas, an American clergyman and educator; born in New Brunswick, N. J., Jan. 7, 1818. He was president of Harvard College, 1862–1868. He wrote "Geometry and Faith" (1849); "Curvature" (1850); "In the Woods and Elsewhere" (1888), a collection of poetry, etc.; and several text-books. He died in Waltham, Mass., Nov. 2, 1891.

Hillah, or **Hilla,** a town of Turkey in Asia; on the Euphrates river, 60 miles S. of Bagdad, on and out of the ruins of which it is built. Tanning, and the manufacture of silk, cotton, and woolens are carried on.

Hillard, George Stillman, an American lawyer; born in Machias, Me., Sept. 22, 1808. As a Massachusetts legislator he was commended by Daniel Webster, and he was conspicuous as an orator. He published "Six Months in Italy" (1853); "Life of George Ticknor" (with Mrs. Ticknor); "Life of George B. McClellan" (1864); also a series of school readers, and an edi-

tion of Spenser. He died in Boston, Mass., Jan. 21, 1879.

Hillebrand, Karl (hil'le-brant), a German critic and historian; born in Giessen, Sept. 17, 1829. For participation in the insurrection in Baden (1849) he was imprisoned, but escaped to France, where he graduated at the Sorbonne, and in 1863 became Professor of Foreign Languages at Douai. On the outbreak of the Franco-Prussian War he removed to Italy and passed the remainder of his life there. Among his valuable publications, in French, German, Italian, and English, are: "On Good Comedy" (1863); "Contemporary Prussia" (1867); "Italian Studies" (1868); "Times, Peoples, and Men" (7 vols. 1875–1885); two volumes of a "History of France from the Accession of Louis Philippe to the Fall of Napoleon III." (1877–1879); "Lectures on German Thought" (1880). He died in Florence, Italy, Oct. 19, 1884.

Hillel the Elder, surnamed HASSAKEN, a Jewish rabbi; born in Babylonia. He lived in the century preceding the Christian era. At the age of 40 he removed to Jerusalem, where he studied the law with such diligence as to become master of the chief school of that city. He formed a new digest of the traditionary law, from which the "Michna," or earliest part of the Talmud, is derived. Shammai, one of his disciples, dissented from his master, and set up a new college, which produced violent contests among the Jews; but the party of Hillel proved victorious. He lived to the great age of 120 years.

Hillel the Younger, called NASI, or prince of the captivity, presided over the Jewish Church in the 3d and 4th centuries, and distinguished himself by his great astronomical learning, reforming the Jewish calendar, regulating the period of the equinoxes, etc. Hillel was also one of the doctors to whom is ascribed that portion of the Talmud called "Gemara."

Hiller, Ferdinand, a German composer; born of Hebrew descent in Frankfort-on-the Main, Oct. 24, 1811. He became kapellmeister at Düsseldorf in 1847, and at Cologne in 1850, and conducted the Rhine festivals whenever they were held in the latter city. Among his works are many notable concertos, as well as symphonies, cantatas, songs, chamber music, etc., and an oratorio, "The Destruction of Jerusalem." He died in Cologne, May 10, 1885.

Hiller, or **Hüller, Johann Adam,** a German composer; born in Wendischossig, Prussia, Dec. 25, 1728. He took up his residence in Leipsic in 1758 and established a series of public concerts, known since 1781 as the "Gewandhaus concerts" from the name of the hall in which they are held. He was the first composer of operettas, and also wrote church music and songs. He died in Leipsic, June 16, 1804.

Hillern, Wilhelmine von (hil'lern), a German novelist (daughter of Charlotte Birch-Pfeiffer); born in Munich, March 11, 1836. In early life she was an actress. In 1857 she married Baron von Hillern. Her novels began to appear in 1862, winning rapid fame. In 1882 she became a widow. "Double Life"; "A Physician to the Soul"; "The Geyer-Wally"; and numerous other works of fiction have had a wide circulation. Her efforts as a dramatist have not endured, but one or two of her novels have been adapted for the stage.

Hill Forts, the refuges and strongholds of the early inhabitants, existing in every country of Europe. Their range in time extends from the early prehistoric through the early historic periods of the racial areas in which they are found. They have no more definite form than that of a prevailing but irregular circularity. The site selected is usually enclosed and fortified with due regard to its specialties of situation and defensibility. Sometimes the fort instead of occupying the whole hill-top may occupy only the most defensible part of it. In other cases the whole eminence may be surrounded by defensive constructions completely encircling and protecting its upper portion. Occasionally these forts, though situated among the hills, are planted in the lower ground, commanding an extent of meadow land or pasture. With regard to their construction, the hill forts are usually either earthworks or stoneworks, rarely a mixture of both.

Hillhouse, James Abraham, an American poet; born in New Haven, Conn., Sept. 26, 1789. A merchant in New York, he retired from business in 1822. He wrote: "The Judgment, a Vision" (1812); and the dramas "Percy's Masque" (1820) and "Hadad" (1825). His "Dramas, Discourses and other Pieces" appeared in 1839. He died near New Haven, Jan. 4, 1841.

Hilliard, Henry Washington, an American lawyer; born in Fayetteville, N. C., Aug. 4, 1808. He was graduated at South Carolina College in 1826, was admitted to the bar in 1829, and was a member of Congress from Alabama in 1845–1851. During the Civil War he was a Brigadier-General in the Confederate army He was United States minister to Brazil, in 1877–1881. He wrote: "Speeches and Addresses" (1855); "De Vane, a Story of Plebeians and Patricians" (1865); and "Politics and Pen Pictures" (1892). He died in Atlanta, Ga., Dec. 17, 1892.

Hill of Scandal, The, the Mount of Olives, so called by Milton.

Hill of Tarik (tä′rik), the rock of Gibraltar, named after the Berber leader, Tarik, who conquered the fort in 711.

Hillsdale, a city and county-seat of Hillsdale co., Mich.; on the Michigan Central and Lake Shore railroad; 60 miles W. of Toledo. It is the seat of Hillsdale College, and is the manufacturing and trade center of the county. It has four mills, and aluminum works, daily and weekly newspapers, electric lights, a National bank, and an assessed property valuation of $2,000,000. Pop. (1900) 4,151; (1910) 5,001.

Hillsdale College, a coeducational institution in Hillsdale, Mich.; founded in 1855 under the auspices of the Free Baptist Church; has endowment exceeding $260,000; grounds and buildings valued at over $100,000; scientific apparatus, etc., $40,000; volumes in the library, about 17,000; ordinary income, $25,000; average number of faculty, 23; average student attendance, 360; graduates, over 1,200.

Hill States, a collective name given to several independent and feudatory states of India. They are situated on the E. side of the Sutlej, and comprise about 20 states, including Sirmar, Bilaspur, Bashahr, Gubbul, etc.

Hill Tribes, in ethnology, remnants of the early tribes found among the inhabitants of hills. As a rule there are such remnants of the tribes which possessed the plains before their present occupants seized on them. Thus, in the British Isles, the Gaelic-speaking population of the Highlands once occupied also the Lowlands of Scotland, and the inhabitants of the Welsh hills the plains of England. The term hill tribes is now used chiefly of the Indian aborigines in the Himalayas, the Vindhya, the Western Ghauts, the Neilgherry Hills, etc. They are divided into many tribes, as Gonds, Khoonds, Bheels, etc., are mostly Turanian, and were in India before the Brahmans had invaded the land; have a primitive faith, in some cases attended by human sacrifices, speak truth, are brave, but rude and uncivilized. They number several millions. Many of them are becoming Christians in belief.

Hilprecht (hil′prec*ht*), **Herman Volrath,** an American educator; born in Hohenerxleben, Germany, July 28, 1859; was graduated at the Ducal Gymnasium, Bernburg, Germany, in 1880; studied at the University of Leipsic in 1880-1885; was Professor of Assyrian and Comparative Semitic Philology at the University of Pennsylvania in 1886-1910. He is a leading authority in cuneiform palæography, having made extensive explorations in Asia Minor, Syria, and Babylonia, and is the author of many contributions to Babylonian and Oriental chronology, archæology, history, philology, and palæography.

Hilton Head, an island off the S. E. coast of Beaufort district, S. C.; at the mouth of Broad river. During the Civil War a strong fortification was erected here by the Confederates, called Fort Walker, armed with 20 guns, and garrisoned by a force of 620 men. This fort was attacked Nov. 5, 1861, by a Union fleet under Commodore Dupont, and captured, after a smart action, in which a Confederate flotilla, or "mosquito fleet," under Commodore Tatnall, took part. The National loss was reported at 8 killed and 23 wounded, that of the Confederates, 10 killed and 10 wounded.

Himalayas (him-a-lā′yaz), **The,** or the **Himalaya Mountains,** an extensive mountain range of Asia, and the loftiest in the world, bounding Hindustan on the N. and separating it from the table-land of Tibet, which stands 10,000 feet above the sea. This chain is continuous W. with the Hindu Kush and Behor-Tagh, and E. with the Chinese table-land of Yun-nan; but the term Himalaya is usually restricted by geographers to that portion of the range lying between the passages of the Indus and Brahmaputra; the former being in lat. 35° N., and lon. 75° E., and the latter in 28° 15′ N., and lon. 96° E. The direction of the range, as thus defined, is S. E. from the Indus to the Gunduk, and thence E. to its termination. Its entire length is 1,900 miles; its average breadth is 90 miles, and the surface which it covers is estimated at 160,000 square miles. The average height of the Himalayas has been estimated at 15,700 feet. The principal peaks are: Mount Everest, 29,002 feet; Kunchinjinga, in Sikkim, 28,178 feet; W. peak of the same, 27,826 feet; Dhawalagiri, in Nepal, 26,862 feet; Dhawahir, in Kumaon, 25,749 feet. The passes over the main ridge amount to about 20, a few of which only are practicable for horses, sheep being principally used as beasts of burden over the steep acclivities. The limit of perpetual congelation in this chain is about 12,000 feet above sea-level.

The only rock sufficiently extensive to characterize the geological formation of this great chain is gneiss, which constitutes the substance of the highest ridges and crests. Granite, schist, clay-slate, and red sandstone are also met with. The chief minerals hereto found are gold-dust, copper, lead, iron, antimony, manganese, sulphur, alum, and rock-salt. There are no direct traces of volcanoes so far discovered by English explorers, but the numerous thermal springs, and many shocks of earthquake felt by travelers in many parts of the range, indicate it to be the focus of derangements

of the earth's crust. The height at which plants and trees flourish on the Himalayas varies on the N. and S. slopes nearly proportionally to the difference in the altitude of the snow-line. On the S. slope grain cultivation is not attempted higher than 10,000 feet; the highest habitation is at 9,000 feet; pines show their best growth at an elevation of 10,300 feet. The rhododendron grows up to 12,000 feet, and birches are found as high as 13,000 feet above the sea. On the N. side, villages are found as high as 13,000 feet, grain is cultivated at 13,500 feet, birch trees rise to 14,000 feet; and vegetation is met with at 17,500 feet. Wheat, barley, and other grains are found on these heights. Strawberries and currants thrive on the S. slope, at an altitude of 11,600 feet.

The mammalia of the Himalayas are chiefly confined to ruminating animals, a few varieties only of the horse and cat tribes being found in these regions. The wild horse is seen on the N. side of the range; but the principal tenants of the hilly slopes are the yak, much used as a beast of burden by the Tartars, the ghurls (*Capcr ægragus*), of which the Cashmere and Tibet goats are varieties, the Nepal stag, the black deer, the chirn, or one-horned antelope, the goral, and the nylghau Among the birds are the lammergeyer (*Gypætus barbatus*), the common cuckoo, the Impeyan pheasant (*Lophophorus refulgens*), the red-legged crow, and the wood-pigeon.

Himantopus (-man'tō-pus), a genus of grallatorial birds, family *Recurvirostridæ*, distinguished by the great length of their legs; from which circumstance they are sometimes called stilt birds. One species is found in this country, the black-necked stilt, *H. nigricollis* (Vieill.). This bird, called in Europe the Long-legged Plover, is 14 inches long. As its conformation would lead us to conclude, it is a bird whose most congenial habitat is morasses, and the low, flat shores of lakes, rivers, and seas. Like many of the true grallatores, it possesses the power of swimming with the greatest ease and lightness. Few birds exceed it in the powers of flight; its wings far exceed the tail, and it passes through the air with astonishing rapidity. When on firm ground, it appears as if tottering on long and awkward stilts, but firm ground is not its congenial sphere.

Himera (him'e-rä), an ancient Greek city of Northern Sicily, at the mouth of the river Himera, between Panormus and Cephalædium, founded by a colony from Zancle, 648 B. C. A great battle was fought near the city, between the Carthaginians and the Sicilians, the latter being victorious, 480 B. C. Some new colonists, of Doric extraction, arrived here, 476 B. C. It was razed to the ground by the Carthaginians, 408 B. C. Many of the inhabitants returned and founded a new city near the site of Himera, 405 B. C. Agathocles was defeated at Himera, 310 B. C.

Himyarites (him'ya-rīts), a race or group of races in Arabia, regarded as descendants of Himyar, one of the mythical ancestors of the Arabs. According to tradition they became the dominant race in Yemen about 3,000 years before Mohammed, and spread to the Euphrates on the one hand and Abyssinia on the other. Their most flourishing period appears to have been from about 100 B. C. till A. D. 629, when they succumbed to Mohammedanism. The Himyaritic language, not now spoken, formed, with the Arabic and Ethiopic, the S. branch of the Semitic family of tongues. During the last 100 years several hundreds of Himyaritic inscriptions have been collected, and deciphered by means of alphabets with the corresponding Arabic letters which had been preserved. The Mahrah tribes of Southern Arabia are the direct descendants of the ancient Himyarites.

Hincks, Francis, a Canadian statesman; born in Cork, Ireland, Dec. 14, 1807; received a fair education; settled in Toronto, Canada, in 1832; later engaged in journalism there. His political career began in 1841, when he was elected to the Canada Assembly; was premier of Canada in 1851–1854; and governor of British Guiana in 1862–1869. He died in Montreal, Canada, Aug. 18, 1885.

Hind, John Russell, an English astronomer; born in Nottingham, England, May 12, 1823. In 1840 he obtained a situation in, the Royal Observatory at Greenwich where he remained till June, 1844. He was then sent as one of the commission appointed to determine the exact longitude of Valentia, and on his return became the observer in Mr. Bishop's Observatory, Regent's Park, London. Here he calculated the orbits and declination of more than 70 planets and comets, noted a number of new movable stars, and between 1847 and 1854 discovered 10 minor planets (see PLANETOIDS). In 1851 he obtained from the Academy of Sciences at Paris their Lalande medal, and was elected a corresponding member; in 1852 he obtained the Astronomical Society of London's gold medal, and a pension of $1,000 a year from the British government; in 1853 he undertook the editing of the "Nautical Almanac." He wrote: "Astronomical Vocabulary (1852); "The Comets" (1852); "The Solar System" (1852); "Illustrated London Astronomy" (1853); "Elements of Algebra" (1855); "Descriptive Treatise on Comets" (1857). In 1880 he was president of the Royal Astronomical

Society. He died in Twickenham, England, Dec. 22, 1895.

Hindi (hin'dē), the language spoken in the valley of the Ganges and its tributaries, from the watershed of the Jumna as far down as Rajmahal. It is the legitimate heir of the Sanskrit, and fills that place in the modern Indian system which Sanskrit filled in the old. It probably had its origin in the country around Delhi, and includes many dialects.

Hindley, Charles, an English bookseller and journalist. He wrote several books, but is best known as the author of "Mother Shipton's Prophecy." He died in Brighton, England, in May, 1893.

Hinduism, the system of religious belief held by the ordinary Hindus, as distinguished from that of the Indian aborigines and the Musselman and Christian invaders. (See BRAHMANISM: CASTE). Hinduism is not a homogenous system of belief, but a conglomerate, in large measure derived from prior faiths.

Hindu Kush (hin'dö kösh), or **Indian Caucasus,** a mountain system of Central Asia. It is generally considered as a continuation of the Himalayas, which it adjoins at the Indus, and then stretches W. till it unites with the Ghur Mountains in North Afghanistan. Its culminating point, in the range of Hindu-Koh, to the N. of Cabul, is far beyond the limit of perpetual snow, but is not supposed to exceed 20,000 feet. In many features the Hindu Kush resembles the Himalayas proper, though it is lower and destitute of forests.

Hindustan (hin-dö-stän'), the name commonly given to the whole Indian empire, but which properly applies only to the Punjab and the valley of the Ganges. See INDIA.

Hindustan, Rome of. See ROME OF HINDUSTAN.

Hindustani (-stä'nē), a native of Hindustan proper. The word is also applied to a language which apparently arose from the efforts made by the Hindus and their Mohammedan conquerors to understand each other. It approaches HINDI (*q. v.*), but has a large admixture of both Persian and Arabic words foreign to India. Hindustani will carry one all over India, but is really the vernacular of the Mohammedans only, and not of the Hindus properly so called. It is sometimes called Urdu or Oordoo. When people speak of the Indian language they mean Hindustani, but the designation is erroneous. There are at least 12 leading Indian languages.

Hingham, a town in Plymouth co., Mass., on Massachusetts Bay, and on the Old Colony railroad; 14 miles S. E. of Boston. It is a popular summer resort, with steamship connections with Boston, and has the oldest "Meeting House" in New England, first occupied in 1682. It has a high school, Derby Academy, public library, important manufacturing and fishing interests, a National bank, and weekly newspapers. Pop. (1900) 5,059; (1910) 4,965.

Hinny, a hybrid, the produce of a stallion and a she-ass. It is smaller and inferior in strength to the mule produced by an ass and a mare.

Hinton, James, an English aurist and metaphysician; born in Reading, England, in 1822. He was the son of a Baptist minister, studied medicine at St. Bartholomew's Hospital, and, after much travel, settled about 1850 to a London practice, ultimately becoming a specialist in aural surgery. From 1862 till 1874 he was a lecturer on this department at Guy's Hospital. He wrote: "Man and His Dwelling-place" (1859); "Life in Nature" (1862); "The Mystery of Pain" (1865); "Philosophy and Religion" (1881); "The Law-breaker and Coming of the Law" (1884). He died Dec. 16, 1875.

Hinton, Richard Josiah, an American author; born in London, England, Nov. 25, 1830; settled in the United States in 1851; studied topographical engineering at the Columbia School of Mines; removed to Kansas in 1856 and became a supporter of the cause of John Brown; served in the National army in 1861–1865; and was the first white man appointed to raise and lead colored troops. After the war he became engaged in newspaper work, which he pursued in Washington, New York, and San Francisco. He was the author of "Life of William H. Seward"; "Life of Gen. P. H. Sheridan"; "John Brown"; etc. He died Dec. 20, 1901.

Hinzelmann (hint'sel-män), the most famous house spirit or kobold of German legend. He lived four years in the old castle of Hudemühlen, where he had a room set apart for him; at the end of the fourth year (1588) he went away of his own accord, and never again returned.

Hiogo (hē-ō'gō), a seaport of Japan, opened to foreign trade in 1860. It is situated on the island of Hondo, on the Bay of Osaka, 40 miles S. W. of Kioto, with which it has railway communication. The trade with the interior is important, and the exports of tea, copper, fish, silk, etc., large. Pop. (1903), with Kobé, 285,002.

Hiouen-Thsang (hē-wen' tsäng), a celebrated Chinese traveler, professing the Buddhist creed, who visited 110 countries and places of India in the 7th century (629–645), and gave a very interesting account of the condition of Buddhism as it prevailed at that period in India. Considering the many curious notices he gives

on matters which came under his observation, and the general trustworthiness of his narrative, his memoirs are one of the most important works on the history of India in general, and of Buddhism in particular, during the period stated.

Hip, the fruit of the dog-rose or wild-brier. It contains tannin, sugar, citric and malic acids, and is sometimes used in making conserves.

Hip Joint, one of the most important articulations in the body, and the most complete example of the ball-and-socket joint. The hip joint is made up of two bones — the acetabulum, or cup-like cavity in the os innominatum, or three bones forming one-half of the pelvis; and the head of the femur, or thigh-bone, the same provision being made here, by capsular, conical, transverse, and lateral ligaments, to secure the bone in its socket, and yet afford unlimited play to the limb; while, to guard it from blows and the force of accidents, the part is padded with a number of short, fleshy muscles, in addition to which a quantity of adipose tissue beneath the cuticle still further protects the part.

Hip Joint, Disease of the, a disease differing in many important points from other joint-diseases. Its connection with scrofula is more distinctly marked than that of most other joint diseases, and it almost always occurs before the age of puberty. It comes on, in children or young persons of a scrofulous constitution, from very slight causes; thus, it is often traced to over-exertion in a long walk, a sprain in jumping, or a fall; and in many cases no apparent cause can be assigned. In the early stage of the disease the whole of the structures of the joint are inflamed, and by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint, and often communicate with its interior; and the acetabulum and the head and neck of the thigh-bone become disintegrated, softened, and gritty. In a still more advanced stage dislocation of the head of the thigh-bone commonly occurs, either from the capsular ligament becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity, and pushing the head of the bone before it. It is of extreme importance that the symptoms should be detected in an early stage of the disease.

As the disease advances abscesses occur around the joint. True shortening of the limb now takes place, which at the same time becomes adducted and inverted. From this stage, if the health is pretty good, and the lungs are sound, the patient may be so fortunate as to recover with an anchylosed (or immovable) hip joint; but the probability is that exhaustion and hectic will come on, and that death will supervene, from the wasting influence of the purulent discharges occasioned by the diseased bone. The duration of the disease may vary from two or three months to 10 or more years. As the treatment must be left entirely in the hands of the surgeon it is unnecessary to say more than that the most important points are perfect rest to the affected part, which may be effected in various ways, the internal administration of cod-liver oil and tonics, and the application of counter-irritation by means of an issue behind the great trochanter.

Hipparchus (-pär'kus), tyrant of Athens. He was son of PISISTRATUS (*q. v.*), and brother of HIPPIAS (*q. v.*), with whom he reigned 527–514, B. C. While conducting in Athens a solemn procession to the Temple of Minerva, he was slain by HARMODIUS (*q. v.*) and ARISTOGEITON (*q. v.*), B. C. 514.

Hipparchus, an ancient Greek astronomer; born in Nicæa, Bithynia. He lived about 160–125 B. C. He resided for some time at Rhodes, but afterward went to Alexandria, then the great school of science. A commentary on Aratus is the only work of his extant. He first ascertained the true length of the year, discovered the precession of the equinoxes, determined the revolutions and mean motions of the planets, prepared a catalogue of the fixed stars, etc.

Hippeau, Célestin (ē-pō'), a French educator and author; born in Niort, Deux-Sèvres, France, May 11, 1803. He filled different positions as a teacher and professor at Strasburg, Paris, Caen, etc., and was sent to England and the United States by the minister of public instruction to study their educational systems. His publications on educational and literary subjects include: "Norman Writers of the Seventeenth Century" (1857); "History of the Government of Normandy" (1863–1873); "Public Instruction in the United States" (1869); "Dictionary of the French Language in the Twelfth and Thirteenth Centuries" (1873). He died in Paris, May 31, 1883.

Hippel, Theodor Gottlieb von (hip'-pel), a German ethical writer; born in Gerdauen, East Prussia, Jan. 31, 1741. His great but singularly contradictory character is revealed in his many writings. His best-known work is on "Marriage." Other productions include: "The Education of Woman"; "The Civil Emancipation of Woman"; and "Biographies in the Ascending Line, with Supplements A, B, C," a peculiar piece of fiction in which a sardonic humor is combined with profound observation and knowledge of life. A powerful political satire,

"Carpenter I. and Frederick II., by John Henry Frederick Quincetree, Wood Carver, of Hanover. Printed at Solitude," and other similar efforts, are characteristic exhibitions of his strange genius. He died in Königsberg April 23, 1796.

Hippias (hip'pi-as), tyrant of Athens. He was the son of Pisistratus, at whose death he assumed the government, in conjunction with his brother HIPPARCHUS (*q. v.*), on whose death he seized the reins of government, and revenged the death of his brother by putting to death all of whom he entertained the least suspicion. His tyranny at last became so obnoxious to the citizens that he was expelled from the city 510 B. C. He afterward induced Darius to apply to the Athenians in his favor; and their decisive refusal kindled the first war of the Persians against the European Greeks. According to some authorities the fate of Hippias was decided on the field of Marathon, where he fell on that memorable day, fighting against his countrymen, 490 B. C.

Hippo, sometimes called Hippo Regius to distinguish it from another town of the same name on the Carthaginian coast; an ancient Numidian city, the ruins of which still exist a short distance S. of Bona in Algeria. It was the episcopal see of St. Augustine, and was destroyed by the Vandals in 430.

Hippoboscidæ (-bos'si-dē), a family of dipterous insects, parasitic on birds and quadrupeds. The type is the genus *Hippobosca* or horsefly.

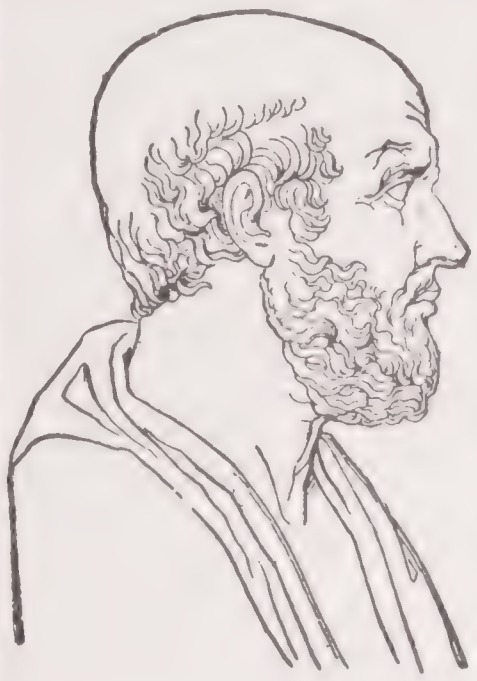
Hippocampus, a genus of fishes, closely allied to the pipefishes, of singular construction and peculiar habits; the upper parts have some resemblance to the head and neck of a horse in miniature, which has suggested the name. When swimming they maintain a vertical position; their general length is from 6 to 10 inches, and they occur in the Mediterranean and Atlantic.

Hippocampus Major, in anatomy, a large white eminence extending the whole length of the cornu in the cerebrum. It becomes enlarged toward its anterior and lower extremity, and is indented or notched on its edge, so as to resemble the paw of an animal, on which account it has been termed *pes hippocampi*. Named also *Cornu Ammonis*.

Hippocampus Minor, in anatomy, a curved and pointed longitudinal eminence on the inner side of the posterior cornu, projecting backward into the posterior lobe of the cerebrum. Its existence became known to the general public through a controversy whether or not the hippocampus minor was peculiar to man, or whether it existed also in the anthropoid apes. Prof. Richard Owen took the first view and Professor Huxley the second.

Hippocras, a spiced beverage, held in great esteem by the monks in the Middle Ages as a warm and grateful cordial and stimulant in cases of cold, and also as a beverage in winter nights, and for the aged and relaxed. The spiced hippocras, as it was called, was made differently by different nations and persons; in general, however, it consisted of cinnamon, cloves, nutmegs, mace, ginger, grains of paradise and canella bark, bruised and macerated for seven days in Canary wine (Madeira), and then sweetened either with honey or sugar strained and taken warm. The "ypocras," for lords and abbots, was somewhat more potent, and was prepared with aqua vitæ, or brandy, pepper, ginger, cloves, grains of paradise, ambergris, and musk.

Hippocrates (-pok'ra-tēz), the greatest physician of ancient times, usually designated the "Father of Medicine"; born in the Island of Cos, about 460 B. C. He was one of the family of the ASCLEPIADES (*q. v.*), and the contemporary of Socrates and Plato; he began to be illustrious during the Peloponnesian war. He was educated by his father Heraclides and by Herodicus, and it is said that he also became a pupil of the sophist Georgias and the philosopher Democritus. He traveled extensively, and at length settled in Thessaly. Among his authentic writings are: "Prognosis"; "Aphorisms"; "On Epidemics"; "On Diet in Acute Diseases"; "On Air, Water, and Place"; "On Wounds of the Head." He was distinguished for his remarkable skill in diagnosis, and his accurate and vivid description of morbid symptoms. Many striking sayings are scattered through his works which have passed into familiar use. He died in Larissa, Thessaly, about 377 B. C.



HIPPOCRATES.

Hippocrene (hip'pō-krēn), a celebrated fountain on Mount Helicon in Bœotia, sacred to the Muses. It was fabled to have burst from the ground when struck by the feet of Pegasus, and to possess the power of poetic inspiration. See HELICON.

Hippodamia. See BRISEIS.

Hippodrome, the Greek name for the public place where the horse and chariot

races were held. In Byzantine times the hippodrome at Constantinople acquired great renown, and factions originating in the hippodrome caused perpetual confusion in all departments of the public service. The name is sometimes applied to a modern circus.

Hippogriff, or **Hippogryph** (hip′pō-grif), in Greek mythology, a fabulous animal, represented as a winged horse, with the head of dragon or griffin.

Hippolyte (-pol′i-tē), in classical mythology, a queen of the Amazons, given in marriage to Theseus by Hercules, who had conquered her, and taken away her girdle by order of Eurystheus. She had a son by Theseus, called HIPPOLYTUS (*q. v.*).

Hippolytus (-pol′i-tus), in classical mythology, a son of Theseus and Hippolyte, famous for his continence. His step-mother, Phædra, fell in love with him, and when he refused to pollute his father's bed, she accused him of offering violence to her person before Theseus, who, believing the accusation, entreated Neptune to punish his son. Hippolytus fled from the resentment of his father, and, as he pursued his way along the seashore, his horses were so frightened at the noise of sea-calves, which Neptune had purposely sent there, that they ran about the rocks till his chariot was broken, and his body torn to pieces. On this myth, Euripides founded his play entitled "Hippolytus."

Hippolytus, an early Christian bishop and writer, the details of whose history are involved in obscurity. He appears to have lived about the beginning of the 3d century, and is supposed to have suffered martyrdom under Alexander Severus. The most important of his writings is the "Philosophumena," a refutation of heresies, discovered in 1842.

Hippomane (-pom′a-nē), a genus of plants, order *Euphorbiaceæ*. The species *H. manicella* is the famous Manchineel tree, which is asserted to be so poisonous that persons have died from merely sleeping in its shade. It flourishes in the Antilles and on the American continent, near the sea, and forms a very handsome tree, with foliage not unlike that of the pear tree. The juice which fills the tree is of a pure white color, and when dropped on the hand it burns like fire, forming an ulcer very difficult to heal. Seamen state, that if seawater be applied to the eyes when affected by the poison, it allays the inflammation in an effectual manner. The fruit, which resembles a very beautiful apple in appearance, contains a similar juice, but of a milder character. The burning of the lips immediately warns those who bite it of the danger of eating it. The timber is beautifully variegated, and susceptible of a high polish.

Hippomenes (-mē′nēz), a Grecian prince, who, beating ATALANTA (*q. v.*) in the race by throwing golden apples before her, married her. They were changed by Cybele into lions.

Hipponous, the original name of the celebrated Bellerophon, the son of Glaucus and of a daughter of Sisyphus, King of Corinth. He is said to have received the name of Bellerophon from having killed a noble Corinthian called Bellerus. According to one account, having unintentionally killed his brother, he fled to Prœtus, King of Argos, who received him hospitably, and purified him according to the Greek rites. But Queen Antea soon conceived a criminal love for the youth; and when Bellerophon, revering the rites of hospitality did not return her affection, she avenged herself by calumniating the innocent youth to her husband. Prœtus sent him to his father-in-law, Iobates, King of Lycia, with tablets having characters engraved on them which were of dangerous import to the bearer. Iobates, in compliance with the hospitable custom of the heroes of antiquity, entertained the stranger during the space of nine days before he inquired into the object of his visit; and having on the tenth day learned his commission, he also feared to lay hands on his guest. He ordered him, however, to kill the Chimæra, a monster which had three heads, and breathed fire, being convinced that no valor would enable him to sustain this combat. But Bellerophon, mounted on Pegasus — a present from Pallas — fought in the air, and overpowered the monster. After this Iobates sent him against the Solymi, and then the Amazons, whom he conquered. Iobates then, recognizing the divine origin of the youth, gave him his daughter Philonoë in marriage, and shared his kingdom with him. The children of Bellerophon were Isander, Hippolochus, and Laodameia. His after history is differently related. According to some he attempted to rise with Pegasus to heaven, but Zeus sent a gad-fly which stung the winged horse so that he threw his rider, who in consequence became lame or blind. Homer, who knows nothing of the story of Bellerophon killing the Chimæra by the aid of Pegasus, makes him wander lonely through the Aleïan field, avoiding men and consumed with grief.

Hippophagy (-pof′a-ji), a name given by the Greeks to a Scythian people, living N. E. of the Caspian Sea, and to a Sarmatian tribe N. of the Euxine, who were said to be eaters of horseflesh. In some parts of modern Europe horseflesh is a regular and wholesome article of diet. In France a society of hippophagists was formed under the auspices of Geoffroy St. Hilaire; in 1866 the sale of horseflesh in the Paris

Hippopotamus

market as an article of food was officially recognized and regulated; and during the siege of Paris horseflesh was gladly eaten by all who could get it. Poultry are in some places fed on the flesh of old horses.

Hippopotamus, the typical genus of a family of the order *Ungulata,* with an even number of toes, of which only two living species are well ascertained; recent observations, however, have shown that others lived in the earlier ages of the world. The hippopotamus is fully equal to the rhinoceros in size, and is not less formidable. He has four cutting teeth in each jaw, those in the lower jaw straight and pointing forward nearly horizontally, the two middle ones being the longest. The canine teeth or tusks are four in number; those in the upper jaw short, those in the lower very long and obliquely truncated. They are sometimes two feet in length, and weigh upward of six pounds. These tusks are in great request with the makers of artificial teeth, as they are not likely to turn yellow. In figure the hippopotamus more closely resembles an unwieldy ox than any other animal. A male hippopotamus has been known to be 17 feet in length, seven in height, and 15 in circumference. The head is very large, being 3½ feet in length; the mouth is amazingly wide, the ears small, pointed, and lined with fine short hairs; the eyes and nostrils are small; the lips very thick, broad, and beset with a few scattered tufts of short bristles; the body is thinly covered with very short whitish hair, more sparingly distributed on the under parts; the tail is short, slightly compressed, and almost bare; the legs are short and thick; the feet large, the toes four, each furnished with a hoof, and all resting on the ground; the skin is very thick and of a dusky color.

The hippopotamus is confined to Africa, and abounds most in the lakes and rivers of Abyssinia and the equatorial regions; but the animal is also found in considerable numbers in the Gambia, Niger, etc. They formerly were plentiful in South Africa, but they are now nearly extinct, though still found about the mouth of the Orange, on the Upper Zambesi, in Zululand, Mashonaland, etc.

The hippopotamus appears to have been well known to the ancients, though their descriptions of its form and habits are inaccurate. Thus Aristotle and Pliny describe it as having hoofs like an ox, a mane like a horse, a flat nose and a tail like a hog. That the latter author should have been so erroneous is extraordinary, as several of these animals had been exhibited at Rome. Scaurus during his ædileship had five crocodiles and a hippopotamus in a temporary lake, and Augustus produced one on the occasion of his triumph over Cleopatra, and we find the figure of it on medals and mosaic pavements. But the ancients knew no other mode of description than that of comparing the parts of an unknown animal with those of animals well known, hence giving rise to innumerable errors. The behemoth of Job is considered by commentators to be the hippopotamus, as the description of his size, manners, food, and haunts is not unlike those of the latter animal. Among the fables of the ancients respecting it is, that it vomited fire, and Pliny relates that this animal, when he feels his habit overcharged, repairs to some place covered with sharp reeds, and obtains a discharge of blood by lying down on them in such a posture that they pierce the tender parts of his skin. Among the ancient Egyptians it was revered as a divinity, as it is among the negroes of Kongo, Elmina, etc.

The great strength of the hippopotamus would render it one of the most formidable of quadrupeds were its disposition ferocious; but it is comparatively mild and gentle, except under great provocation or when wounded. When excited, however, its fury is remarkable; it often destroys boats with its teeth, or upsets them by raising them on its back. There is no doubt that it can be tamed. Live specimens are to be seen in the Zoölogical Gardens at London and elsewhere, and even in traveling menageries. The first hippopotamus seen alive in Europe in modern times was brought to London from the White Nile, and arrived in May, 1850. The voice of the young is a squeak like that of a hog; that of the adult is said by some writers to resemble the neighing of a horse, while others represent it as a loud sonorous noise, between the bellowing of an ox and the roaring of an elephant. Despite the unwieldiness of his body and the shortness of his legs the hippopotamus can move with remarkable swiftness on land; when pursued he takes to the water, and, plunging in head foremost, sinks to the bottom, where, it is said, he can move along with the same slow and stately pace as in the open air. He can continue thus immersed for five minutes or even longer, without even raising his nostrils above the surface for breath. In manners the hippopotamus resembles somewhat the hog. His sleeping place is usually muddy islands overgrown with reeds; in these places also the female brings forth. She goes with young nearly eight months, and produces but one at a birth. She is often seen in the rivers with her calf on her back. The hippopotamus is mainly a nocturnal animal, especially in regions where it is hunted with vigor. While it is resting in inactivity various insect-eating birds wander about on its back hunting out the numerous parasites which infest it. These birds are also said to act as sentinels in giving it warning of approaching danger.

Though the hippopotamus is an inhabitant of the waters, his food is entirely of a

vegetable character, in search of which he leaves his liquid residence and ranges along the banks, committing wide devastations through all the adjoining country. On the banks of the Upper Nile and other streams he often defeats the hopes of the husbandman, whole fields of grain and sugar cane being not only destroyed to satisfy his appetite, but also trampled down by his great weight. It has been asserted that the hippopotamus devours great quantities of fish; but it appears from the best evidence, both of travelers and from his anatomical structure, that he is nourished exclusively on vegetable food. The stomach like that of the ruminating animals is divided into three or four pouches, and there is no cæcum.

The flesh of the hippopotamus is eaten in Africa, and many of the aboriginal peoples are extremely fond of it. The fat resembles lard. The choice pieces are said to be the gelatinous part of the feet and the tongue. The hide, which, as has already been stated, is very thick, is converted by the negroes into shields, and is also used in making the whips known as *sjamboks*. The teeth are esteemed as furnishing excellent ivory. The modes of capturing these animals, adopted by the natives of the regions where they abound, are various. A common mode is by means of pitfalls dug in places which are frequented by the hippopotami, and carefully concealed by a covering of branches, leaves, grass, etc. Another mode common in some parts is to use a kind of trap, which, as described by Livingstone from observation of it on the Zambesi, consists of a beam five or six feet long, armed with a spearhead or hardwood spike, covered with poison and suspended to a forked pole by a cord, which, coming down to the path, is held by a catch, to be set free when the beast treads on it, so that the sharp spike will enter its back. The most dangerous method is harpooning them; this, however, is a very common mode in Africa, and it is said that it is by no means rare to see 10 or 12 canoes employed in this kind of chase. Some of the natives catch them by driving them into a pool where there is no vegetation, and keeping them there till starvation m kes them an easy prey.

The Liberian hippopotamus (*H. liberiensis*), found in Western Africa, is a much smaller and lighter animal, blackish above and whitish below. Its length is only about six feet. The remains of several extinct species have been discove.ed in Europe. The largest is the *Hippopotamus antiquus*, or *H. major*, larger than the existing species; the bones of this animal are found in considerable numbers in the Val d'Arno Superiore in Tuscany, near Montpellier and Paris in France, and at many places in Great Britain. The islands of Malta and Sicily have yielded many remains of a small species known as *H. minutus*, and also of a rather larger one, *H. Pentlandi*. Several interesting fossil species have been obtained from the Pliocene and Pleistocene deposits of some parts of India, a country which, like Europe, contains no living species. *H. palœindicus* and *H. nomadicus* occur in the valley of the Narbada. Burma yields remains of *H. irawadicus* and from the Himalaya region *H. sivalensis* is represented. Algeria also yields a fossil species, and likewise Madagascar. Falconer and Cautley recognized two groups in the family, that to which the existing species, *H. amphibius*, as well as the fossil species of Europe, belong, all these possessing two incisors on either side of each jaw, and hence called *Tetraprotodon;* and the *Hexaprotodon* group, in which there were three incisors.

Hippuric Acid, an acid existing in the urine of herbivorous animals, and in small quantity in that of human beings. It is increased by a vegetable diet, by the disease called diabetes, and may be caused to appear in the urine in considerable quantity by using benzoic acid with the food. Hippuric acid is obtained by evaporating fresh horse urine to one-eighth its volume, and adding hydrochloric acid, when the impure hippuric acid crystallizes out. By redissolving in boiling water, and bleaching with animal charcoal, the acid is obtained in white prismatic crystals. It is soluble in 500 parts of cold water, but dissolves readily in boiling water and alcohol. With bases, hippuric acid forms salt remarkable for their beautiful crystalline forms. When heated, it yields benzoic and cyanohydric acids; when boiled with powerful acids, it yields benzoic acid and glycocoll; and it yields benzoic acid when treated with oxidizing agents, as when its solution is boiled with brown oxide of lead, or with sulphuric acid and peroxide of manganese, and also when it is heated with sulphuric acid at a temperature of 248°.

Hippuris (-pū'ris), in botany, mare's tail, a genus of *Haloragaceæ*, tribe *Haloragcæ*. The perianth is single, superior, forming a very indistinct rim to the germen; stamen one; style one; fruit one-celled, one-seeded. Known species one or two.

Hippurites (-ī'tēz), a genus of fossil bivalves, having the under shell of great depth, and of a conical form, with a flat lid or operculum, occurring in the lower chalk. They are allied to the living Chama, or gaping cockle. The *H. limestone* is an important representative of the Cretaceous rocks in the S. of France and the Pyrenees, characterized by a large admixture of shells of the family *Hippuritidæ*.

Hiproof, a roof, the ends of which slope so as to have the same inclination to the horizon as its other two sides, being thus of a triangular form.

Hiram, a King of Tyre, who sent to congratulate David on his accession to the throne, and aided him in building his palace (II Sam. v: 11; I Chr. xiv: 1). He was the father of Abibaal of secular history. Also a king of Tyre, a grandson of the former (II Chr. ii: 14), and like him a friend of David. He congratulated Solomon at the commencement of his reign, and furnished essential aid in building the Temple.

Hiram College, a coeducational institution in Hiram, O.; founded in 1850 under the auspices of the Christian Church; has grounds and buildings valued at over $130,000; productive funds, about $225,000; volumes in the library, over 12,000; scientific apparatus, etc., $22,000; ordinary income, about $35,000; average number of faculty, 24; average student attendance, 280; graduates, over 680.

Hirst, Henry Beck, an American poet; born in Philadelphia, Pa., Aug. 23, 1813; wrote "Endymion, a Tale of Greece"; "The Penance of Roland"; "The Coming of the Mammoth, and Other Poems." He also published a "Poetical Dictionary." He died in Philadelphia, March 30, 1874.

Hirth, Friedrich, an American educator; born in 1849; entered the Chinese customs service in 1870; was engaged in the statistical work relating to the commerce of China, in Shanghai in 1877–1888; in Hong-Kong in 1890–1895; and in Munich, Germany, in 1897–1902, when he was called to the newly created Department of Chinese in Columbia University. In the summer of 1902 he was in St. Petersburg, cataloguing an enormous collection of Chinese manuscripts captured at Peking.

Hissar, a province of Bokhara, from which it is separated by a S. offset of the W. prolongation of the Thian-Shan Mountains. This range forms its N. boundary. The country consists of a series of valleys, radiating from this mountainous background, and lying open on the S., traversed by streams which flow in general S. or S. W. to join the Oxus or Amu-Daria. The soil is fertile, and yields wheat, flax, cotton, rice, and garden fruits. Copper and rock-salt abound. The inhabitants (number not exactly known) are chiefly Usbegs and Tajiks. They export corn, salt, flax, and sheep to Bokhara. The main route from India to Bokhara passes through the province; and Hissar has its chief access with Bokhara, 230 miles to the N. W., through a celebrated pass called Kohluga or the Iron Gate. The province was annexed by the Emir of Bokhara in 1869. The capital is the town of Hissar, with 15,000 inhabitants, on the Kafirnihan river. Its people are noted sword makers.

Histology, that branch of anatomy which examines and treats of the minute structure of the tissues of which living organisms are composed. It is divided into several sections. Human histology treats of the tissues of man; comparative histology treats of the tissues of the lower animals; and vegetable histology treats of the tissues of plants. By others histology is divided into three sections: general histology, which considers the tissues of which the human and animal body generally is composed; histology proper, in which the various tissues in their anatomical relations and composition are considered; and topographical histology, dealing with the more minute structure of the organs and systems of the body. Each of these subdivisions may be divided again into normal histology, which refers to the healthy tissues, and pathological histology, which investigates the changes they undergo in disease. Marie François Xavier Bichat (1771–1802) is generally credited with the foundation of the science of histology. Unfortunately the imperfect condition of the microscope in his time prevented Bichat and his contemporaries from carrying their investigations to the point which Schleiden, Schwann, Johann Müller, Virchow, Von Recklinghausen, Cohnheim, etc., have reached. The marvellous powers developed by the compound microscope enable investigators to penetrate into the most recondite tissues. It has been found that all structures however complex are made up of cells, and that the parts of a body may be resolved into a small number of elementary tissues now grouped as: (1) epithelium, which lines almost all the cavities of the body and is directly or indirectly in communication with the atmosphere; (2) the nervous tissues, which as nerve cells originate and as nervous fibers transmit all nervous impulses; (3) muscle, which produces motion whether voluntary or involuntary; (4) glandular tissue which consists of cells standing in close relation with the blood-vessels and which take from the blood certain substances and secrete them; (5) connective substances which support and hold together the more delicate and important structures, especially forming the cartilages and bones.

Many tissues have the power of repairing injuries that happen to them. This power is called regeneration and is found especially in the lower animals, in polyps, worms, and in many amphibious creatures and reptiles. In other cases the lesion is supplied by a new growth of connective substance. In diseases the tissues undergo many changes and many of these diseases in the organism are shown also by the changing of colors. The science of such changes is generally called pathological histology. It is a comparatively young science and has been cultivated by Virchow, who was the founder of cellular pathology.

Vegetable histology is that department of botany which deals with the microscopic phytotomy or anatomy of plants, especially investigating the plant cells and plant tissues. It is properly subordinate to morphology and is a distinctively descriptive science. It deals with the question in what relation the cells or forms of tissue stand to the vital activity of plants, what functions they have to perform, and in what respect they are constituted for the fulfilling of those functions. The science is as yet only in its infancy because it is only in very recent times that the attention of botanists has been turned to the physiological study of plant tissues. Owing to the excessive minuteness of the cells which form the tissues of all plants the investigation rests almost entirely on the microscope, and naturally has made its advance in proportion as the microscope has been made more perfect. Microscopes that are now used magnify at least 1,000 diameters and the materials used have to be carefully prepared and mounted. Many of them have to be colored with hæmatoxylino, fuchsin, saffranine and other alcoholic or aqueous dyes.

HENRY C. CHAPMAN, M. D.

History, the record of the most important bygone events in human history chronologically arranged, with an inquiry into their causes, and the lessons which they afford with regard to human conduct; "philosophy teaching by example." This field of investigation is more limited than that of the Greek "historia," which was used for research on any subject, and somewhat more extensive than the Roman "historia," which would now be called annals. Accounts of the same event are distorted according to the prejudices or interest of the person by whom they are related. Historians in such cases attempt with cold impartiality to ascertain and record the actual truth. Every nation has great gaps in its early history, which verbal tradition and written poetry have had no scruple in filling up with almost purely mythic narratives; the historian must attempt to discriminate truth from fable. The "eyes of history" are geography and chronology. The locality of an event should be recorded, and the date at which it occurred. If a wrong date be introduced the chain of causation in historic events is destroyed at that point; for every event is in that respect the consequent of those which preceded it, and the antecedent of those which followed. History is often divided into sacred and profane. The former is that obtained from the Bible; the lesson which it was designed to teach is what has been called "God in History." Profane, by which is meant not unholy, but secular, history, specially records the rise and growth of the several Gentile nations. A history may be of an institution, an invention or art gradually perfected, as, the history of shipbuilding, the history of painting; or of thought, as, the history of philosophy. Branches of history now named separately are archæology and biography. Also a book treating of the history of any country, people, science, or art.

Hit (ancient Is), a town of Turkey in Asia, on the Euphrates, 85 miles W. N. W. of Bagdad. It has pits of bitumen, which have been worked from time immemorial, and naphtha springs.

Hita, Gines Perez de (ē-tä′), a Spanish historian of the 16th century; author of the celebrated "History of the Civil Wars of Granada"; was of Murcian origin, and fought bravely in the campaigns against the Moors in 1568–1570. His "History" is the first historical romance produced by the Spaniards, and relates in picturesque and imaginative style, and with exquisite purity of language, the events leading up to the expulsion of the Moors from Spain. The narrative is interspersed with delightful legends and stories.

Hitchcock, Charles Henry, an American geologist; son of Prof. Edward Hitchcock; born in Amherst, Mass., Aug. 23, 1836; was graduated at Amherst College; was assistant geologist of Vermont (1857–1861); State Geologist of Maine (1861–1862); and of New Hampshire (1868–1872); Professor of Geology at Dartmouth College after 1869; vice-president of the American Association (1883). He wrote much on geology.

Hitchcock, Edward, an American geologist; born in Deerfield, Mass., May 24, 1793. In the beginning of his career he was pastor of a Congregational Church in Conway, Mass. He was made president of Amherst College in 1845, but resigned in 1854, continuing his professorship there till his death. Amherst College owes to him the founding of its Museum of Natural History, and his writings were among the earliest to call attention in the United States to the study of geology. His "Religion of Geology and Its Connected Sciences" marks a distinct epoch in scientific study in this country. He published also "Reminiscences of Amherst College" in 1863. He died in Amherst, Mass., Feb. 27, 1864.

Hitchcock, Ethan Allen, an American diplomatist; born in Mobile, Ala., Sept. 19, 1835; received an academic education and entered mercantile life; subsequently acting as president of railway and mining corporations. In 1897 he was made United States minister to Russia; in 1898, ambassador; and in 1899, Secretary of the Interior. He died April 9, 1909.

Hitchcock, James Ripley Wellman, an American writer on art; born in Fitchburg, Mass., July 3, 1857. He wrote: "The Western Art Movement" (1885); "A Study of George Genness" (1885); "Madonnas by Old Masters" (1888), the text to photogravures; "The Future of Etching"; "Some American Painters in Water Colors"; "Etching in America"; "Notable Etchings by American Artists"; etc.

Hitchcock, Roswell Dwight, an American theologian; born in East Machias, Me., Aug. 15, 1817. He was long president of Union Theological Seminary. He wrote: "Analysis of the Bible" (1869); "Socialism" (1879); "Life of Edward Robinson"; "Hymns and Songs for Social and Sabbath Worship"; "Eternal Atonement" (with Francis Brown); etc. He died in Somerset, Mass., June 16, 1887.

Hitchin, a market-town of Hertfordshire, England; on the Hiz, through the Ivel a feeder of the Ouse, 32 miles N. N. W. of London. An important railway junction, it has a fine old parish church, a modern town hall, a free school (1622), a Friends' school, etc. The principal trade is in corn, malt, and flour; there are several large breweries; and many females are employed in straw-plaiting. Lavender has been grown here since 1568, and commercially, for lavender-water, since 1823. Hitchin was a place of some consequence in the days of King Alfred. It was the original seat of GIRTON COLLEGE (*q. v.*). Pop. (1901) 10,072.

Hitopadesa (hit-ō-pä-dē'sä), a collection of fables and stories in Sanskrit literature, usually ascribed to the compilation of the Brâhman Vishnusarman. It is a popular summary in four books of the larger work, the famous "Panchatantra," which directly and indirectly has been the source whence a rich stream of folk-tales has flowed over Europe.

Hittell, Theodore Henry, an American historian; born in Marietta, Pa., April 5, 1830. His home is in San Francisco. Besides valuable legal works, including "General Laws of California, 1850–1864" (1868), commonly known as "Hittell's Digest," he has published a critical review of "Goethe's Faust" (1872); the important "History of California" etc.

Hittites (hit'tīts), the English name of a people who waged war with Egypt and Assyria for a thousand years, and who moved on parallel lines with the people of Israel from the call of Abraham to the Captivity. The Hittites have scarcely any record in classical history, but in late years we have much information respecting them from various sources.

When the Semitic tribe with Abraham at their head moved from Haran to Canaan the Hittites inhabited the land (Gen. xv: 20), and 50 years later Abraham, a wandering sheikh, purchased a grave for his wife from the Hittites, who were then in possession and power at Hebron (Gen. xxiii: 4). The patriarch's family continued to live side by side with the Hittites; and Esau, the *bedawi*, the grandson of Abraham, married two Hittite wives, who "were a grief of mind unto Isaac and to Rebekah" (Gen. xxvi: 35). During the sojourn in Egypt the Israelites had the promise of occupying the land of the Hittites oft repeated, and from the bush on Horeb the promise was again renewed to bring them "into the place of the Canaanites, and the Hittites, and the Amorites, and the Perizzites, and the Hivites, and the Jebusites" (Exod. iii: 8).

Next in importance is the testimony of the Egyptian and Assyrian inscriptions. In the Egyptian inscriptions the Hittites stand out as rivals of the Pharaohs in peace and war from the 12th to the 20th dynasty.

The Hitties occupy an important place in the Assyrian inscriptions. The reign of Sargon of Agade has been placed about the 19th century B. C.; and one date has been deciphered, which if correct would fix that reign about 3800 B. C. Even as early as the reign of Sargon I. the Hittites were a formidable power, and it has been supposed that in the time of the 19th dynasty in Egypt the Hittites occupied Mesopotamia. When we come to the era of Tiglath-pileser I., about 1130 B. C., the Hittites were paramount from the Euphrates to the Lebanon. Tiglath-pileser I. drove back the Hittites from his borders, and for a time made them tributaries, but they soon threw off the Assyrian yoke, and a desperate struggle for supremacy was waged for 400 years between the empire of Assyria and that of the Hittites. The reign of Assur-nasir-pal (883–858 B. C.) is largely a record of wars with the Hittites. His son, Shalmaneser, undertook 30 campaigns chiefly "in the land of the Hittites." The war continued to the close of the king's reign, and was carried on by the kings who succeeded him; and 100 years later the Assyrians were still in deadly conflict with the Hittites. The Hittites, who first appear in the Assyrian inscription in the reign of Sargon I., were destined to disappear from history in the reign of his namesake. Sargon II. came to the throne in 721 B. C., and his first year was distinguished by the capture of Samaria and the captivity of the Israelites, and four years later (717 B. C.) he brought the empire of the Hittites to a close by the defeat of Pisiri and the capture of Carchemish.

Thus ended the mighty empire of the Hittites, having maintained its existence, defying all enemies, longer than the empires of Babylon, or Assyria, or Greece, or Rome.

Hivaoa (hē-vā-ō′ä), an island in the South Pacific Ocean, the largest of the S. W. group of the Marquesas; 22 miles long E. to W.; about 10 miles greatest breadth. It is mountainous, and bears indications of volcanic eruptions. Pop. (1904) about 7,000.

Hivites (hiv′īts), a Canaanitish people, the main body of whom lived in the region from Lebanon and Hermon to Hamath, but who had colonies, apparently isolated, in Southern Palestine, as at Gibeon.

Hlassa. See LHASSA.

Hoadly, Benjamin, an English prelate; born in 1676. A stanch Low Churchman, he was appointed Bishop of Bangor in 1715. A sermon preached before the king in 1717 gave rise to the "Bangorian Controversy" regarding the divine authority of the king and the Church. He died in 1761.

Hoadly, Benjamin, an English dramatist; born in London, Feb. 10, 1706. He was educated at Cambridge; settled in London; and became a Fellow of the College of Physicians. Among his works are the "Suspicious Husband" (1747), a comedy which was well received. He also wrote "The Tatlers," and assisted Hogarth in his "Analysis of Beauty." He died in Chelsea, Aug. 10, 1757.

Hoadly, George, an American jurist; born in New Haven, Conn., July 31, 1826; was graduated at Western Reserve College in 1844, and became a lawyer in 1847; was judge of the Supreme Court in Cincinnati, 1859–1866; member of the Ohio State Constitutional Convention of 1873–1874. Originally a Republican, he became a Democrat on the tariff issue; was governor of Ohio, 1883–1885; and began the practice of law in New York city in 1887. He died in Watkins, N. Y., Aug. 29, 1902.

Hoang-ho (hwang′hō), a great river of China, and one of the most prominent features in the geography of that empire. It rises near lat. 34 ° N., lon. 98° E. Though broad and rapid, it is in many places so shallow as to be unfavorable for navigation. It is also liable to overflow its banks, so that it has been necessary, in many places, to raise dykes for the defense of the surrounding country.

Hoar, Ebenezer Rockwood, an American jurist; born in Concord, Mass., Feb. 21, 1816; was judge of the Massachusetts Supreme Court in 1859–1869; United States attorney-general in 1869–1870; joint high commissioner on the Treaty of Washington in 1871, and member of Congress in 1873–1875. He was the son of Samuel Hoar, a lawyer and member of Congress in 1835–1837, and his mother was a daughter of Roger Sherman. He died in Concord, Mass., Jan. 31, 1895.

Hoar, George Frisbie, an American statesman; born in Concord, Mass., Aug. 29, 1826; a brother of Ebenezer R.; was a member of Congress in 1869–1877; member of the Electoral Commission in 1877; and United States Senator from 1877; author of "Autobiography of Seventy Years" (1903). He died Sept. 30, 1904.

Hoarseness, an affection of the throat causing harshness and roughness of voice, due to irregular and imperfect bringing together of the vocal cords, most frequently from swelling of the mucous membrane of the cords, and excessive secretion of mucus in their neighborhood. It arises from a variety of causes, the most common of which is catarrh or cold. Simple hoarseness is treated with soothing remedies, the inhalation of the steam of boiling water, warm poultices to the neck, etc

Hoatzin, or **Hoactzin,** *Opisthocŏmus cristātus,* a singular gregarious South American bird, sometimes called the crested touraco, referred by some naturalists to the family *Cracidæ* (curassows), order *Gallinaceæ;* by some made to form an order by itself (*Opisthocomi*); by others regarded as of the order *Insessores,* and allied to the plantain-eaters. The plumage is brown streaked with white, and the head has a movable crest. It is of the size of a pheasant, and has an enormous crop with a very small gizzard.

Hobart, up to 1881 Hobart Town, the capital of Tasmania; at the foot of Mount Wellington (4,166 feet), on the Derwent river; about 12 miles from its mouth. The city is built in the form of a square, the streets crossing each other at right angles. Among the public buildings are the government house, the government offices, the houses of Parliament, town hall, postoffice, museum, Episcopal and Roman Catholic cathedrals, and several other places of worship, many public and private schools, the general hospital, etc. There are several jam manufactories, breweries, flour mills, tanneries, a woolen factory, etc.; and in connection with the shipping interest first-class patent slips. The harbor is easy of access, and has ample depth, capacity, wharf, and dock accommodation. Hobart is connected by rail with Launceston. Pop. (1908) 34,985.

Hobart, Garret Augustus, a Vice-President of the United States; born in Long Branch, N. J., June 3, 1844; was graduated at Rutgers College in 1863, and admitted to the bar in 1866; practised in Paterson,

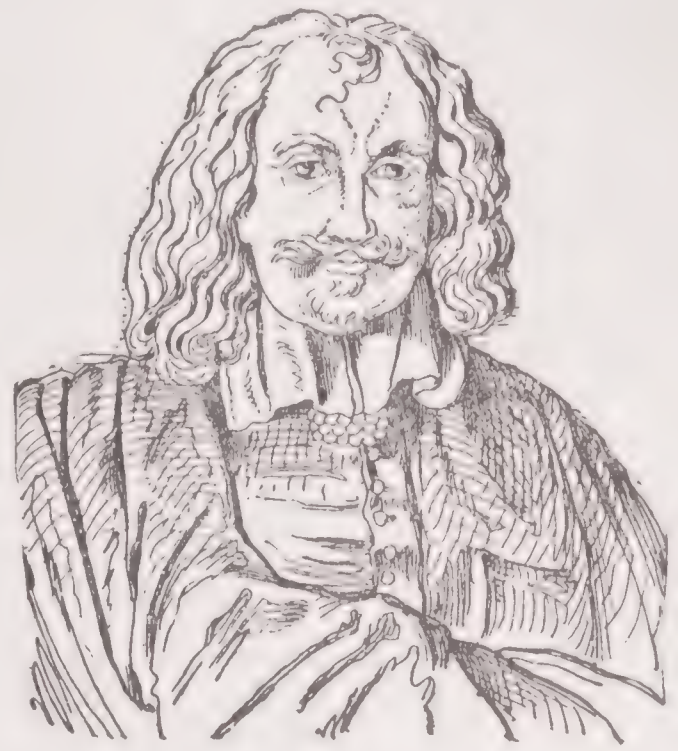
N. J.; was a member of the New Jersey Assembly in 1873–1874, and speaker during the latter year. Later he was chosen a member of the State Senate, of which he was president in 1881–1882. In November, 1896, he was elected Vice-President of the United States; was an able supporter of President McKinley during the war with Spain. He had large financial interests and was known as a man of powerful personality. He died in Paterson, N. J., Nov. 2, 1899.

Hobart Pasha, Augustus Charles Hobart, an English soldier; born in England in 1822. He was the third son of the Earl of Buckinghamshire. Joining the navy in 1836, he saw active service while a midshipman. During the Crimean War he was mentioned in official dispatches for his gallantry. Entering the service of Turkey, he was raised by the Sultan to the rank of "Mushir" and Marshal of the Empire in 1881, being the first Christian to receive this honor. He died in 1886.

Hobbema, Meindert or **Minderhout** (hob'ē-mä), a Dutch landscape painter; born in Amsterdam in 1638. His paintings consist chiefly of forest scenes, ruins, villages, etc., and are highly valued for their excellence in perspective and coloring. The figures in them were generally painted by others. He died in 1709.

Hobbes, John Oliver, pseudonym of Pearl Mary Teresa Craigie, an American novelist and dramatist; born in Boston, Mass., Nov. 3, 1867. In 1887 she married Reginald Walpole Craigie, from whom she obtained a divorce and the custody of her child, in July, 1895. She was educated in Paris and London. Her works include: "Some Emotions and a Moral" (1891); "The Sinner's Comedy" (1892); "A Study in Temptations" (1893); "A Bundle of Life" (1894); "Journeys End in Lovers Meeting," proverb in one act, written for Miss Ellen Terry (1894); "The Gods, Some Mortals, and Lord Wickenham" (1895); "The Herb-Moon" (1896); "School for Saints" (1897); "Robert Orange" (1900). She died Aug. 13, 1906.

Hobbes, Thomas, an English philosopher; born in Malmesbury, in 1588. He lived on intimate terms with Bacon, Ben Jonson, and all the distinguished men of his time; he became tutor to the Prince of Wales, afterward Charles II., and though many of his philosophical and political opinions have been condemned, he must be considered the father of psychology, and the first great English writer on the science of government. His principal works are the treatises "On the Citizen" and "The Leviathan," both of which were censured by Parliament in 1666; "Human Nature"; "On the Body Politic"; "On Liberty, Necessity and Cause"; and "Behemoth." He died in 1679.



THOMAS HOBBES.

Hoboken, a city in Hudson co., N. J., on the Hudson river opposite New York city, and on the Lackawanna, and the West Shore railroads. It is connected with New York city by steam ferries, and has five European steamship lines. It is the seat of Stevens Institute of Technology, and has considerable manufacturing interests. It has electric lights, and street railways, waterworks, public schools, public library, high school, Hoboken Academy, Academy of the Sacred Heart, Stevens Preparatory School, daily and weekly newspapers, National banks, and an assessed property valuation of $28,000,000. Pop. (1890) 43,-648; (1910) 70,324.

Hobson, Richmond Pearson, an American naval officer; born in Greensboro, Ala., Aug. 17, 1870; was graduated at the United States Naval Academy in 1889, and received further training in the Ecole d'Application du Génie Maritime, Paris. In 1894–1895 he served in the Bureau of Construction and Repairs of the Navy Department. Subsequently he originated a post-graduate course for such officers as intended to study naval construction, and conducted the course in 1897–1898. At the outbreak of the American-Spanish War he was promoted lieutenant, and assigned to duty on the flag-ship "New York," with which he participated in the blockade of Santiago Harbor, the bombardment of Matanzas, and in the naval demonstration against San Juan, Porto Rico. The event, however, with which his name is most intimately connected was the sinking of the collier "Merrimac" on June 3, 1898, in the narrow entrance of Santiago Harbor, with the inten-

tion of preventing the Spanish fleet from leaving the inner bay. As the "Merrimac" was sinking he and seven volunteers who had accompanied him leaped overboard and were picked up by the Spaniards and imprisoned for a few weeks, but were treated with kindness by the order of Admiral Cervera. Later he went to Manila, where he directed the raising and repairing of the Spanish ships sunk in the engagement with Admiral Dewey. He returned to the United States in 1901, resigned from the navy in 1903, Member of Congress in 1907-1911; works: "The Disappearing Gun Afloat"; "The Sinking of the Merrimac"; etc.

Hobson's Choice, a choice without an alternative; that which is tendered, or nothing; the one thing or none. This phrase is said to have originated from one Hobson, a livery-stable keeper at Cambridge, England, who obliged each customer requiring the hire of a horse to take the next in turn, or that which stood nearest the stable-door.

Hoche, Lazare, a general in the French Revolutionary War; born in Montreuil near Versailles, June 25, 1768. He took service in the regiment of French guards when 16 years old. On the outbreak of the Revolution he joined the popular party. He greatly distinguished himself at the siege of Thionville and the defense of Dunkirk, and shortly afterward when scarcely 25 years of age, received the command of the army on the Moselle. Though at first compelled to retreat before the Duke of Brunswick, he afterward defeated General Wurmser at Weissenburg; delivered Landau; took Germersheim, Spires, Worms, etc.; and drove the Austrians out of Alsace. The glory he acquired by these victories excited the jealousy of Pichegru, who accused Hoche of aiming at a dictatorship, in consequence of which he was removed from the head of the army which he had led to victory, on the pretense of being intrusted with a higher command, and then arrested and committed to prison (1793). In 1794 he was released, and toward the end of the same year was appointed commander of the army destined to quell the rising in the West, and afterward to that in La Vendée, and in both cases he showed the capacities of a statesman as well as a general. In 1796 he conceived the plan of attacking Great Britain by making a descent on Ireland. He accordingly set sail in December from Brest, but a storm dispersed the fleet; he found himself alone near the coast of the enemy, and he was obliged to return from his expedition without having even effected a landing. After his return he received the command of the Army of the Sambre and Meuse. He opened the campaign of 1797 by a bold passage over the Rhine in the face of the enemy. In four days he had marched with his army 35 leagues, had been victorious in three battles and five skirmishes, and taken Wetzlar, when he was stopped in the path of victory by the news of the armistice concluded in Italy. He died suddenly Sept. 18, 1797, soon after being placed at the head of the combined armies of the Sambre and Meuse and the Rhine and Moselle.

Hochheim, a town of Prussia in Hesse-Nassau, on the right bank of the Main, 3 miles E. of Mainz. Here is produced the excellent white wine known as "Hochheimer," whence was derived, before 1625, the English name "Hock," now applied loosely to almost any white Rhenish wine.

Hochkirch, or **Hochkirchen** (ho*h*-kēr*h*), a village in Saxony, a few miles from Bautzen. It was the scene of a battle between the Austrians and Prussians (1758) during the Seven Years' War. Frederick II., with an army of 30,000, was attacked by Marshal Daun, with 65,000 Austrians, and compelled to retire to the heights of Drehsa. Frederick lost 9,000 men killed and wounded and 101 cannon. He and most of his generals were wounded, and Marshal Keith and Prince Francis of Brunswick were killed. The Austrians lost 6,000 men.

Höchstadt. See BLENHEIM.

Hockey, a game of ball known as "shinty" in Scotland, and "hurling" in Ireland. It is played with a club curved at the lower end, by a number of persons divided into two parties or sides; and the object of each side is to drive the ball into that part of the field marked off as their opponents' goal. In England the game is quite popular. In the United States it is played by school boys, who sometimes call the game "shinney."

Hocktide, or **Hoketide,** an English anniversary held on a Monday or Tuesday following the second Sunday after Easter. On one day, generally on Tuesday, the women held the roads and streets, and stopped all men who came their way, and having bound them with cords, only set them at liberty after they had paid a small sum of money. On the other day the men had their turn, and collected from the women. The custom goes back to the 13th century, but became obsolete in the 18th.

Hodeken (hōd'ek-en), a German goblin or domestic fairy, so called because he alalways wore a little felt hat over his face.

Hodell, Frans Oscar Leonard (ho'del), a Swedish dramatist; born in Stockholm, Aug. 13, 1840. For 10 years he was an actor. His original and adapted plays number nearly 100. Among the most popular were: "Andersson, Petersson, and Lundström" (1866); "The Factory Girl"

(1868); "The Seamstresses" (1868); "Three Pairs of Shoes" (1881). From 1870 till his death he was editor of the "Sunday Puck," a comic paper. He died May 24, 1890.

Hodge, Charles, an American theologian; born in Philadelphia, Pa., Dec. 28, 1797. He was graduated at Princeton College in 1815, and joined the teaching staff of the theological seminary in 1820. He founded the "Princeton Review"; was the author of numerous theological essays, commentaries, and a work on "Systematic Theology." He died in 1878.

Hodgkinson, Eaton, an English engineer; born in Anderton, Cheshire, England, Feb. 26, 1789. At the age of 21 he settled in Manchester. At this time the principal authority on iron beams was Tredgold, but his theories were overturned by Hodgkinson. Hodgkinson next made a series of 227 experiments on the strength of pillars, generally in conjunction with Sir William Fairbairn. In 1847 he was appointed Professor of the Mechanics of Engineering in University College, London. He died June 18, 1861.

Hodograph, of a moving particle, the curve passing through the extremities of those lines which, drawn from a fixed point as origin, represent in direction and magnitude the velocities of the particle at the different points of its path. It is a velocity diagram of a particular kind.

Hodometer (hō-dom'ē-ter), an instrument for measuring the length of road traveled. It consists of a clock-work arrangement fixed to the side of the vehicle and connected with the axle. The distance traveled is recorded on a dial.

Hodson, William Stephen Raikes, an English soldier; born near Gloucester, March 19, 1821. He joined the Indian army in 1845, and got his first experience in the Sikh war. From 1849 to 1852 Hodson was employed in the work of civil government in the Punjab. In 1856 he was deprived of command on account of irregularities in the regimental accounts and of his unjust treatment of the troops and natives under his authority. In the crisis of the mutiny, however, he was appointed head of the intelligence department in the army engaged before Delhi, and was commissioned to raise a new regiment of irregular cavalry, which became known as Hodson's Horse. With this body of men Hodson took part in the siege of Delhi, and in the subsequent operations down to the siege of Lucknow. After the fall of Delhi Hodson discovered the Mogul sovereign and his sons; these last he shot dead with his own hand at the time of capture. He himself was shot on March 11, 1858, during the assault on a royal palace in Lucknow, and died on the following day.

Hödur, or **Höder** (hō'der), in Scandinavian mythology, a god of darkness, the blind god who killed Balder, at the instigation of Loki. Hödur typifies night, as Balder typifies day.

Hoe, Richard Marsh, an American inventor; born in New York city, Sept. 12, 1812. In 1846 he perfected a rotary printing-press which was called "Hoe's lightning press." Subsequently he invented the Hoe web-perfecting press. These were especially adapted to newspaper printing and made a revolution in that art. He died in Florence, Italy, June 7, 1886.

Hoefer, Edmund (ho'fer), a German novelist; born in Greifswald, Oct. 15, 1819. He studied philology and history at Heidelberg. In 1852 he resided in Stuttgart, and was associated with Hackländer in founding the "Hausblätter." He began early to write fiction, his first stories appearing in collected form under the title "From the People," and proving very popular. They were followed by "Out of the Old Time and the New"; "As the People Speak"; and "Days that Are No More." In 1858, the success of "Norien, the Recollections of an Old Woman," encouraged him to write a long story. The novels that followed, especially "German Hearts"; "The Demagogue"; "The Lost Son"; and "Lost in the World," have had a wide circulation. He died in Cannstadt, May 23, 1882.

Höegh-Guldberg, Frederick (huh*h*-göld'bārg), a Danish poet and philologist; born in Copenhagen, March 26, 1771; son of the eminent statesman Ove Höegh-Guldberg; early became noted for his patriotic poems, a collected edition of which, in one volume, has sold extensively. He was an authority on Danish grammar. He died in Copenhagen, Sept. 21, 1852.

Hoey, Mrs. Frances Sarah, an Irish novelist; born in Bushy Park, County Dublin, Feb. 15, 1830. She married, in 1846, Adam Murray Stewart, and in 1858, Cashel Hoey. From 1860 she was a contributor to "Chambers' Journal," "Belgravia," and other periodicals. She was the author of the popular novels: "A House of Cards"; "A Golden Sorrow"; "Out of Court"; "The Blossoming of an Aloe"; "The Lover's Creed"; "A Stern Chase." Among her translations from the French are "Memoirs of Madame de Rémusat"; "The King's Secret"; "The Last Days of the Consulate" "Buried in the Deep"; etc.

Hofdyk, Willem Jakobsz (hof'dīk), a Dutch historian and poet; born in Alkmaar, June 27, 1816. As village schoolmaster his leisure was devoted to the study of Dutch philology, history, and the arts. From

1850 to 1856 he was instructor in history and literature at the college in Amsterdam. Among his numerous and valuable historical writings are: "Historic Eras," in Dutch annals; "The Netherlands People"; and "Historical View of the Monasteries in the Netherlands." The best of his poems is "Kennemerland"; but his narrative poems "Helene," "Griffo de Saliër," and some others would give him a conspicuous place in Dutch literature. He died in Arnheim, Aug. 29, 1888.

Hofer, Andreas (huh'fer), a Tyrolese patriot; born in St. Leonard, in the valley of Passeyr, in 1767. When the Tyrol, long a part of the Austrian dominions, was given by the treaty of Presburg to the King of Bavaria, then the ally of Napoleon, the Tyrolese revolted, and Andreas Hofer became their leader. Within a week from the outbreak of the insurrection, early in April, 1809, the Bavarian forces were everywhere defeated and the Tyrol freed. Three French armies then invaded the province, and after temporary success on their part, Hofer won the victory of Innspruck, and again freed his country. By the armistice of Znaim, agreed to after the victory of Napoleon at Wagram, the Austrians were compelled to quit the Tyrol. A second French invasion ended in defeat, and the people were a third time freed. For a few weeks Hofer was, virtually, sovereign of his country; but on the renewed invasion of French and Bavarians, he was betrayed to his enemies, condemned by a court-martial at Mantua, and shot Feb. 20, 1810.

Hoffman, Charles Fenno, an American poet and novelist; born in New York city, in 1806. He was originally a lawyer. He founded the "Knickerbocker Magazine," edited the "Literary World," and was owner and editor of the "American Magazine." His finest work was his songs, the best known being "Sparkling and Bright," and "The Myrtle and Steel." He wrote the novel "Grayslaer" (1840). His complete poetical works appeared in 1874. He died in Harrisburg, Pa., June 7, 1884.

Hoffman, David, an American lawyer; born in Baltimore, Md., Dec. 25, 1874. He was Professor of Law in the University of Maryland 1817–1836. He wrote "Chronicles Selected from the Originals of Cartaphilus, the Wandering Jew" (2 vols. 1853), being the beginning of what he intended to be a history of the world but never completed; "Thoughts on Men and Things" (1837); "Viator, or a Peep into my Note-Book" (1841); etc. He died in New York, Nov. 11, 1854.

Hoffman, Wickham, an American diplomatist; born in New York city, April 2, 1821. He served in the Civil War, was secretary of legation at Paris, London, St. Petersburg, and minister to Denmark. He wrote: "Camp, Court, and Siege" (1877), narrating personal adventures and observations during the Civil War, and the siege of Paris and the Commune; "Leisure Hours in Russia" (1883). He died in Atlantic City, N. J., May 21, 1900.

Hoffman, or **Hoffmann,** the name of several Germans distinguished for their medical knowledge. MORITZ HOFFMANN, a German scientist; born in Fürstenwalde, Brandenburg, in 1621; settled at Altorf, where he held the professorships of anatomy, botany, and physic; was the discoverer of the pancreatic duct; died in 1698. He wrote several works on medical subjects. FRIEDRICH HOFFMAN, a German physician; born in Halle, Saxony, 1660, where his father was also an eminent physician. He studied and lectured at Jena, and afterward practised at Minden. In 1684 he visited England, and formed an acquaintance with Boyle and other men of science. On the establishment of the University of Halle, he was appointed primary Professor of Medicine and Natural Philosophy; and thrice held the situation of rector. His reputation being now fully established, and his fame widely spread, he was elected a member of various scientific associations in London, Berlin, and St. Petersburg; and appointed physician to the King of Prussia, who gave him the title of first physician and aulic councillor. His works are very numerous, the most important being his "System of Rational Medicine" and "Consultary Medicine." He obtained much reputation by the new hypothesis which he suggested on the origin of disease, and which, after serving a temporary purpose, led to the establishment of other and sounder hypotheses. He died in 1742.

Hoffmann, August Heinrich (hof'-män), commonly called HOFFMANN VON FALLERSLEBEN, a German philologist; born in Fallersleben, Luneberg, April 2, 1798. He was destined for theology, but having made the acquaintance of the brothers Grimm, he devoted himself to philological studies, and traveled through the Rhine countries and Holland in search of popular poetry. In 1830 he was appointed Professor of German Literature, but the publication of his "Unpolitical Songs" (1840–1841), in spite of their innocent title, led to his dismissal. For several years afterward he wandered through Europe till restored to favor in 1848. His own "Poems" (1834); "German Street Songs" (1843); "Soldier Songs" (1851–1852); etc., are characterized by genuine simplicity and pathos; and his other publications—"Belgian Hours" (1830–1852), a collection of Low German folk-songs; "Foundations for the History of the German Language and Literature" (1830–1837); "History of German Church

Hymnology" (1832), are of great philological value. He died at the Castle of Korwei, Prussia, Jan. 19, 1874.

Hoffmann, Ernst Theodor Amadeus, or, properly, **Ernst Theodor Wilhelm,** a German novelist; born in Königsberg, East Prussia, Jan. 24, 1776, where he studied law. He afterward held a judicial appointment in Berlin. He was appointed in 1800 assessor in the government of Posen; in 1802, councillor in the government of Plock; and in 1803 went in the same official character to Warsaw. The invasion of the French in 1806 finished his career in that city. Without prospects in his native country, and without property, he employed his musical knowledge as a means of support for several years. In 1316 he was reinstated as councillor in the court of judicature of Berlin, where he died, June 25, 1822. From his youth he devoted all his leisure hours to the study of music. Among his works are the "Phantasiestücke" in Callot's "Manier" (1814); "Die Elixire des Teufels" (1816); the "Nachtstücke" (1817); the "Serapionsbrüder" (23 tales, 1819); and many others. Hoffman was an irregular and unhappy man. He possessed much imagination and talent, but little soundness of mind; and his habits were intemperate. His judicial duties, however, were faithfully performed. In his longer novels he has a strong tendency to make use of supernatural machinery; but his masterpieces are his short tales (such as "Meister Martin, und seine Gesellen," "Das Majorat," "Fraülein Scudéry," "Doge und Dogaresse," etc.), in which he dispenses with that means of exciting the reader's attention.

Hoffmann, Franz, a German author; born in Bernburg, Feb. 21, 1814. He was partner with his brother Karl in the book business, but subsequently traveled about and supported himself by writing stories for children. His many books have attained wide popularity, and not a few have been translated into all civilized tongues. He founded a popular periodical for children "Neuer Deutsche Jugendfreund." He died in Dresden, July 11, 1882.

Hoffmann, Hans, a German novelist and poet; born in Stettin, July 27, 1848. He studied philology at Bonn and in Italy, and became a professor at the Stettin Academy after the publication in 1871 of his noteworthy dissertation on the Nibelungen. After a brilliant career as an educator, he began, in 1878, the writing of novels and lyrics which rapidly won him reputation. His first fiction was on an Italian theme, "Under Blue Skies" (1881). Among others, "Brigitta von Wisby," "Ivan the Terrible and his Dog," and a humorous romance, "The Iron Captain of the Horse," met with favor. "Landsturm" is a tragic tale. His "In Life's Path" and other volumes of lyrics and narrative poems won instant appreciation.

Hoffmann, Heinrich, a German humorist; born in Frankfort-on-the-Main, June 21, 1809. He made a practice of drawing comical pictures to amuse children while treating their complaints. These were published in 1845 under the title of "Struwwelpeter," which has gone through 140 editions and was reproduced in nearly every country of Europe, with translations of the humorous letterpress. He also published several volumes of drama and verse under the assumed name of "Donner." He died in Frankfort, Sept. 20, 1894.

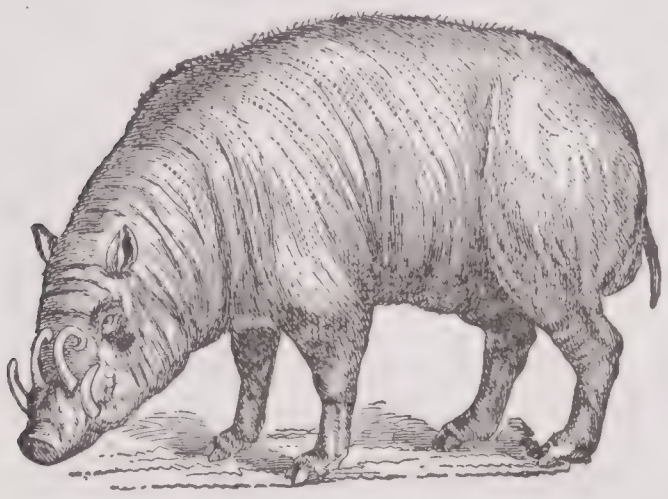
Hofmann, August Wilhelm, a German chemist; born in Giessen, April 8, 1818. After obtaining the degree of doctor of philosophy, he became assistant to Liebig in the laboratory at Giessen. His contributions to the scientific journals here and in Germany are mainly on organic chemistry. It was in the course of these researches that from coal-products he obtained aniline. He devoted much time and labor to the development of the theory of chemical types. His "Introduction to Modern Chemistry" led to great reforms in the teaching of chemistry. He died May 5, 1892.

Hofmann, Friedrich (hof'män), a German editor; born in Coburg, April 18, 1813. After graduating at Jena he formed a connection with the editorial staff of Meyer's "Konversations-Lexikon" and subsequently with other important educational undertakings. He wrote "The Battle of Focksan," a drama; "Childhood Joys," poems; "The Harp in the Storm," a work of a historical nature; "The Rat Catcher of Hameln"; and many other productions. He died in Ilmenau, Aug. 14, 1888.

Hofmann von Hofmannswaldau, Christian (hof'män fon hof'mäns-väld'ou), a German poet; born in Breslau, Dec. 25, 1617. After traveling through England, France, and Italy, he returned to Breslau, and though not of legal age was chosen to the legislative chamber, of which he afterward became the presiding officer. He was in the diplomatic service for a time. His literary work comprises odes, epigrams, wedding songs, and the like. His "Occasional Poems" and "Hero Letters" are admirable, though betraying English influence. He died in Breslau, April 18, 1679.

Hog, in zoölogy, *Sus scrofa.* It has two large teeth or tusks in the upper, and two in the lower, jaw. The body is covered with bristles. When wild it is of a dark brindled hue, with soft short hairs beneath its bristles. In domestication the ears become long, sharp-pointed, and pendent. The hog when wild feeds on beech-mast, chestnuts, acorns, crabs, haws, sloes, hips, grass, and roots. When he can obtain miry ground

to wallow in, he regales himself with frogs, ferns, and the roots of rushes. In domestication he will eat almost anything in the least digestible — an uncleanly but valuable scavenger. The flesh of the hog when fresh is called pork, when cured, ham or bacon. The ordinary lard is used for culinary purposes, the fat of the bowels for greasing axles. The bristles are made into brushes, pencils, etc.; the skin into leather. The dung is only less valuable as manure than that of the sheep. There are many breeds of hogs, as the Chinese, the Suffolk, the Berkshire, the Shropshire, the Northampton, the Neapolitan, etc. The point aimed at, is to make the animal quickly increase in flesh without increasing in bone. Clover, potatoes, turnips, cabbages, carrots, parsnips, lettuces, pea-meal, barley-meal, and bran, are useful for fattening hogs. Their period of gestation is about four months; they begin to breed at the age of 18 months to two years, do so twice in a year, and bring forth from 5 to 10, or more, at a time. The hog is wild in Continental Europe, many parts of Asia, and in North Africa. The horned hog, or babiroussa, is



HORNED HOG.

a native of the Indian archipelago. Its upper tusks are very long and curve backward. It has long legs and the flesh is good eating.

Hogan, James Francis, an Irish journalist; born in Nenagh, Tipperary, in 1855. While still an infant he was taken by his parents to Australia. He was educated at St. Patrick's College, Melbourne, and in 1881 joined the staff of the Melbourne "Argus," besides contributing to other journals and colonial periodicals. In 1893 he was elected a Member of Parliament for the Mid Division of Tipperary, and organized the Colonial Party. He is the author of "An Australian Christmas Collection" (1886); "History of the Irish in Australia" (1887); "The Australian in London" (1888); "The Lost Explorer" (1890); "The Convict King" (1891), and "The Gladstone Colony" (1898).

Hogarth, William, a truly great and original painter of life and manners; born in London, England, in 1697. His father, who was the son of a yeoman in the neighborhood of Kendal in Westmoreland, kept a school in the city. Hogarth was bound apprentice to Ellis Gamble, a respectable silversmith of Cranbourne street, Leicester Fields, who employed him in engraving ciphers and crests on spoons and pieces of plate. Having been accidentally present at a drunken fray one Sunday at a public house on the road to Highgate, his humor in sketching characters was first displayed by his drawing one of the unfortunate combatants streaming with blood. Soon after he produced a print of Wanstead Assembly. In 1720 he commenced business for himself, painting portraits, and making designs and book plates for the booksellers, etc. He also painted small groups or family pieces, for which he was very inadequately remunerated, and had sometimes much difficulty in procuring any payment after his pictures were finished. As an instance it is related that a very ugly and deformed nobleman having sat to him, the likeness produced was so strong that his sitter refused to have it, and Hogarth, after several pressing letters for payment, at length told him that if he did not send the money for it he should add a tail and some other appendages, and sell it to Mr. Hare, a famous wild beast man, who had applied to have it to hang up over his booth. This stratagem had the desired effect; Hogarth received the money.

In 1729 Hogarth was secretly married to the only daughter of Sir James Thornhill, and soon after commenced his celebrated series of pictures called the "Harlot's Progress." In the year 1733 this work brought his great powers fairly before the public, for at a meeting of the board of treasury one of the members carried the third print, just then published, and showed it to the other members, as containing, among other excellencies, a striking likeness of Sir John Gonson, and on the board's breaking up all the members went and purchased impressions. Such was now the great sale and popularity of his works that they were copied and pirated, and he was in consequence obliged to apply to Parliament for a protecting act to secure to artists the fruits of their industry, such as had been already granted to authors. Some notion may be formed of the hold the "Harlot's Progress" took on the public mind, by the fact that it was converted into a pantomime and a ballad opera and represented on the stage. The scenes were also engraved in a small size, to adorn the fans of ladies of rank and fashion. In 1745 he issued proposals for an auction of his original pictures including those illustrating the "Harlot's" and the "Rake's Progress." The total sum

which he raised on this occasion was £427, 7*s*., an amount which was no doubt smaller than it would have been but for certain whimsical restrictions which Hogarth himself made as to the manner in which the sale was to be conducted, and which was certainly small compared with the value of the pictures. By this time, however, Hogarth was in easy circumstances. The same year his prints of "Marriage à-la-mode" appeared, which were very successful. But as it had been observed by his detractors that he only painted the dark side of human nature, he commenced a set of designs for a work to be called the "Happy Marriage," which, however, he never finished.

In 1749 having paid a visit to France, he was arrested at Calais while sketching the gate of the town, and on his return he commemorated the affair in his excellent print, "O the Roast Beef of Old England," or "The Gate of Calais." He now purchased a small house in Chiswick, where he chiefly resided, going occasionally to his house in Leicester Fields. In 1753 his work on the "Analysis of Beauty" appeared; in writing which he was assisted successively by Dr. Benjamin Hoadly the physician, Mr. Ralph, Dr. Morell, who finished it, and the Rev. Mr. Townley, who wrote the "Preface." This work was translated into German in 1754, into Italian at Leghorn in 1761, and into French in 1805. In 1762 his health began to give way. He complained much of an inward pain, which was followed by a general decay. The last year of his life he spent chiefly in Chiswick in retouching his plates, in which labor he was assisted by several other engravers. He died there on Oct. 25, 1764. His death was caused by an aneurism of the great artery.

In originality of imagination Hogarth may be placed on an equality with Shakespeare, and in point of execution as a painter he is superior to most artists of the age in which he lived. His genius is at all times enlisted on the side of virtue and morality. He holds the mirror up to nature, and "through the eye corrects the heart." He exhibits vice in all its deformity; villainy is stripped of its cloak, and held up to detestation. There are irresistible power and pathos in the successive scenes of his works. You see his heroes advancing step by step in their career on wickedness; you know where it must end, yet the "last scene of all" seldom fails to stir your feelings deeply.

The works of Hogarth have been frequently republished. Dr. Trusler, of Bath, was author of the earlier notices in the editions accompanied by illustrative letterpress ("Hogarth Moralized," 1768); but Charles Lamb is his best general expositor. His own portrait, painted by himself, with his favorite pug dog, and his six pictures of "Marriage á-la-mode," are now placed in the National Gallery. His four pictures of the "Election" form the richest ornaments of the Soane Museum, London. A catalogue of all his prints will be found in the fourth volume of Walpole's "Anecdotes." A multiplicity of local and temporary circumstances introduced into his pictures has rendered notes necessary to a due comprehension of them — a task which has been well performed in the "Hogarth Illustrated of Ireland." The best edition of his works is that published by Messrs. Bodell (atlas folio, 1790), the plates of which, retouched by Heath and others, have been published several times since, in particular by Bohn. There is a handy edition, with an introductory essay by James Hannay, and descriptive letterpress by Trussler and Roberts. An edition by J. Ireland and J. Nichols, with 150 facsimiles of the originals, may be recommended.

Hoge, Moses Drury, an American clergyman; born in Hampden-Sidney, Va., Sept. 17, 1819; was graduated at Hampden-Sidney College in 1839, and at Hampden-Sidney Seminary in 1843; and was pastor of the Second Presbyterian Church in Richmond, Va., from 1845 till his death. He was an eloquent and energetic preacher; was chaplain at the camp of instruction in Richmond during the Civil War; ran the blockade at Charleston in 1864; and went to London, where he collected 10,000 Bibles, 50,000 Testaments, and 250,000 portions of the Bible, which he distributed among Confederate soldiers. During the General Assembly of the Southern Presbyterian Church in 1874, he succeeded in establishing friendly relations with the Northern Church. He died in Richmond, Va., Jan. 6, 1899.

Hogg, James, a Scotch poet; born in Selkirkshire in 1770. After receiving a very scanty education, he began to earn his bread by daily labor as a shepherd. His early rhymings brought him under the notice of Sir Walter Scott, by whose advice he published a volume of ballads under the title of "The Mountain Bard." The failure of an ill-judged agricultural scheme brought him to Edinburgh, where he published the "Forest Minstrel" (1810), and started a weekly periodical entitled "The Spy," which after a short time became defunct. The appearance of the "Queen's Wake" in 1813, with its charming ballad of Kilmeny, established Hogg's reputation as a poet. In 1815 he published his "Pilgrims of the Sun," which was followed by "Mador of the Moor," the "Poetic Mirror" (a collection of imitations of living poets), "Queen Hynde," and "Dramatic Tales." He died in Altrive, on the Yarrow, in 1835. In personal appearance Hogg was about the middle height, well built, active, and muscular, with sandy hair, expansive forehead, ruddy cheeks, and sharp, lively, gray eyes.

Hohenhausen, Baroness Elizabeth Philippine Amalie (hc″en-hous′en), a German poet, dramatist, and romancer; born in Waldau, near Cassel, Nov. 4, 1789. Her father was Gen. Adam Ludwig von Ochs, and in 1809 she married Baron Leopold von Hohenhausen, who left her a widow in 1848. Her poetry was published in 1817, under the title, "Flowers of Spring." "Nature, Art, and Life," is a volume of her recollections, and "John and Cornelius de Witt" is a historical play of merit. She died in Frankfort-on-the-Oder, Dec. 2, 1857.

Hohenlohe-Schillingsfurst, Clovis Karl Victor, Prince von (hō″en-lō″uh-shēl″ēngs-först), German statesman; born March 31, 1819. After studying at Heidelberg, he entered the public service and was promoted steadily, becoming in 1866 Prime Minister of Bavaria. In the war of 1870 he took a most important part. In 1874 he was chosen to succeed Count Arnim as the German ambassador to France, and held the post till 1885, when he became Governor-General of Alsace-Lorraine. When the crisis, which resulted in the resignation of Count Caprivi and Count Eulenberg arose, in 1894, he was appointed Chancellor and intrusted by the Emperor with the continuance of Count Caprivi's policy. He resigned in 1900, and died July 5, 1901. He married Princess Sayn-Wittgenstein, daughter of an aide of Czar Nicholas I.

Hohenschwangau (hō″en-shväng″ou), a royal castle in Bavaria, 55 miles from Munich, near the right bank of the Lech, and the S. frontier of the kingdom. It stands in a beautiful and romantic district, 2,933 feet above sea level. It was purchased in 1832 by the crown-prince Maximilian of Bavaria, who restored it in the style of a magnificent mediæval feudal castle. On another crag over against Hohenschwangau stands the castle of Neuschwanstein, which was built in 1869–71 on the site of the castle originally called Hohenschwangau by King Louis of Bavaria, in the Early Romanesque style. This castle, too, a most magnificent and romantic structure, contains superb wall-paintings, and displays the utmost splendor in its internal fittings.

Hohenstaufen (hō-en-stou′fen), a German family, founded by Frederick von Büren, who lived about 1040.

In the battle of Merseburg (1080), between the Emperor Henry IV. and his competitor Rudolph of Saubia, Frederick of Staufen, Lord of Hohenstaufen, in the modern kingdom of Würtemberg, at that time in Saubia, between Gmünd and Göppingen, displayed so much courage under the eyes of the emperor that he was rewarded with the duchy of Saubia, and received Agnes, daughter of Henry, in marriage. Thus was laid the foundation of the future greatness of a house whose elevation and fall are among the most important epochs in the history of the German empire. Frederick (died 1105) left two sons, Frederick and Conrad; the elder succeeded him as Duke of Saubia, and the younger was invested (1112) by his uncle, the Emperor Henry V., with the duchy of Eastern Franconia. After the death of the Emperor Henry V. (1125), who was the last male of the Franconian line, his two nephews, Frederick II. (the One-eyed), Duke of Suabia, and Conrad, Duke of Franconia, appear to have aspired to the German crown; but their connection with the late emperor was made the ground of opposition by the directors of the election, the Archbishop of Mayence and the papal legate; and Lothaire of Saxony was elected. This circumstance, with the demand made by the new emperor of the restitution of all the possessions acquired by the lords of Hohenstaufen during the preceding reign, produced a fierce war between the emperor and the two brothers. Lothaire would have been overpowered in this contest had he not preserved himself by a union with Henry the Proud, Duke of Bavaria, to whom he gave his daughter and the duchy of Saxony. Frederick II. was unable to withstand the overwhelming power of both, since his brother Conrad, after his return from the Holy Land, had undertaken a campaign in Italy, where he had caused himself (1123) to be proclaimed king.

The peace of Mühlhausen (1135) between Lothaire and Conrad, put an end to this Ten Years' War. Conrad renounced his title of King of Italy, but received the first rank among the dukes, and both he and his brother regained all their lands. After Lothaire's death (1137) Conrad, Duke of Franconia, of the house of Hohenstaufen, was raised in the beginning of the following year to the throne of Germany, with the title of Conrad III. The inextinguishable hatred of the Guelphs against the house of Hohenstaufen (Ghibellines), the first germ of which lay in the alliance between Henry, Duke of Saxony, and the Emperor Lothaire, was still more inflamed by the Emperor Conrad III. placing Henry under the ban, depriving him of his feudal possessions and otherwise injuring him because he refused to obey his order to relinquish the duchy of Saxony which he held with that of Bavaria, it being contrary to the German constitution for a prince to hold two duchies. After the death of Conrad III. (1152) the confidence which was felt in the Hohenstaufen family caused the choice to fall on his nephew, Frederick III. of Suabia, son of Frederick II. (the One-eyed), called among the German kings Frederick I. Barbarossa (the Red beard), who was followed by Henry VI. (1190), who added by his wife the kingdom of Sicily and Naples to the

hereditary dominions of the family; and he again by Otto IV. (1197) and Frederick II. (1215–1250), all belonging to the same house. After the death of Frederick II. his son Conrad was acknowledged as his successor, with the title of Conrad IV. by most of the States of the empire; but Innocent IV. laid him under an interdict, declared him to be deprived of all his lands, and persecuted him with relentless hatred till his death in 1254.

After the death of Conrad IV. his illegitimate brother Manfred possessed himself of the crown of Sicily; but he lost his life and his crown in a battle near Benevento (1266), and the kingdom for which he strove then passed to Charles of Anjou, the brother of the French king Louis IX. The severe and cruel government of Charles raised up a powerful party against him; their love for the noble house of Hohenstaufen was awakened, and Conradin, the only son of Conrad IV., was called from Bavaria, where he had hitherto lived, in order to ascend his rightful throne. He obeyed the call; but at the battle of Tagliacozzo, on Aug. 23, 1268, had the misfortune to be taken prisoner by his rival, who had him two months later publicly executed at Naples. The possessions of this great family fell after the death of Conradin to Bavaria, Baden, and Würtemberg.

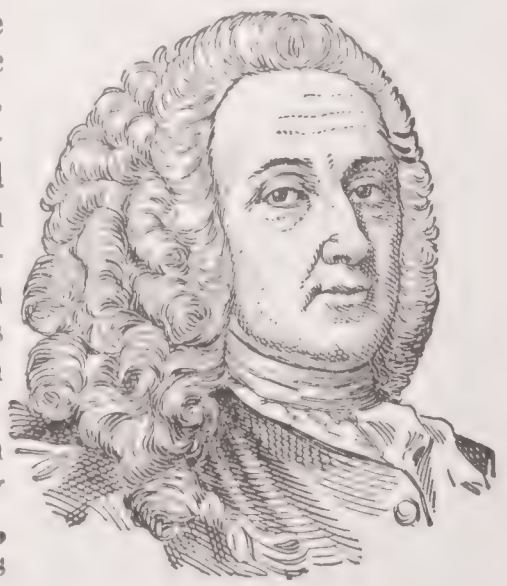
Hohenzollern (hō-en-tsol′urn), a small territory of Germany, since 1852 an administrative division of Prussia. It consists of a long, narrow, irregular strip of country, entirely surrounded by Würtemberg and Baden; area, 450 square miles; pop. (1905) 68,282. The princely family of Hohenzollern dates from Thassilo, Count of Zollern, who died about A. D. 800. There have been several lines and branches, the main one being represented by the present imperial family of Germany.

Holacanthus (hol-ä-kan′thus), a genus of fishes, in character and distribution similar to the *Chætodon*. They are remarkable for the great beauty and symmetry of their colors, and for their excellence as articles of food. The body is compressed, and the gill-cover bears a strong spine. One of the best known of the 40 species, called Emperor of Japan by the Dutch, is *H. imperator*, one of the most esteemed fishes of the East Indies, rivalling the salmon in flavor. Its greatest size is about 15 inches long; its color is deep blue, with numerous narrow bands of orange, the pectoral fins black, the tail bright yellow. In beauty it is rivalled by an allied species, *H. diacanthus*, of similar distribution.

Holbach, Paul Heinrich Dietrich, Baron von, a French philosopher; born in Heidelsheim, in the Palatinate, in 1723. He inherited great wealth from his father, and entertained in his elegant house a number of eminent writers and thinkers of the day, among them Rousseau, Diderot, and Buffon. He was himself a man of no ordinary talent, and held materialistic and atheistic views characteristic of the period preceding the French Revolution, which are expounded in "Christianity Unveiled" (1767); "Spirit of the Clergy" (1767); "Sacerdotal Imposture" (1767); "The System of Nature" (1770); "The Social System" (1773). He died in 1789.

Holbein, Hans, or **Johann** (hol′bīn), a German painter; born in Augsburg, about 1495. He learned the elements of his art from his father, whom he soon excelled. His talent procured him the friendship of Erasmus, for whose "Praise of Folly" he drew several whimsical designs. At the recommendation of Erasmus he came to England, and was employed first by Sir Thomas More, who introduced him to Henry VIII. He rose to the zenith of fortune in that monarch's court, and painted a great number of portraits which are still considered masterpieces of art. His style is manly and correct, but hard and formal; the character, however, and individuality of many of his portraits, are evidently exact and masterly. He painted some religious and historical pieces; his masterpiece is perhaps the "Family of the Burgomaster Meyer," now in the Gallery of Dresden. Holbein is also the author of a very celebrated series of designs, known as the "Dance of Death," cut in wood and first published at Lyons in 1538; afterward copied by Hollar and others. He died of the plague in 1543.

Holberg, Ludwig (hōl′bārg), a Danish poet; born in 1684. He studied at the University of Copenhagen, and afterward traveled through a good part of Europe, spending some time where he taught music in Oxford, and modern languages, and studied modern history and philosophy. In 1718 he was appointed to an ordinary professorship in the University of Copenhagen, where after this date he chiefly resided till his death. In 1735 he was elected rector, and in 1737 treasurer of the university in which he held his professorship, and in 1747 he was raised to the rank of baron. His works may be divided into four classes — poems,



LUDWIG HOLBERG.

stage pieces, philosophical treatises, and historical works. His poems are chiefly of a satirical nature. The most celebrated is "Peder Paars," a comic heroic poem in 14 cantos, which is still regarded throughout the Scandinavian countries as a masterpiece. Almost equally famous in his "Nicolas Klimm's Subterraneous Travels," a satirical romance in prose. His stage pieces are all either comedies or farces, and are nearly all characterized by true comic power. Among his philosophical writings the most important is his "Moral Reflections" (1744). His historical works include "The Political, Ecclesiastical, and Geographical Condition of the Danish Monarchy," "A General History of the Jews," and "A History of Famous Men and Famous Women" (1739–1745). He died in Copenhagen, Jan. 27, 1754.

Holcomb, Silas Alexander, an American jurist; born in Gibson co., Ind., Aug. 25, 1858; was educated in the common schools; settled in Nebraska; became a lawyer; and in 1891 was made judge of the 12th judicial district. He was governor of Nebraska from 1894 to 1898; and was justice of the Supreme Court in 1900-1906.

Holcombe, Chester, an American diplomatist and author; born in Winfield, N. Y., Oct. 16, 1844; was graduated at Union College in 1861; interpreter and secretary to the United States Legation in China, 1871–1885. He became an authority on the Chinese and Chinese affairs, and in 1896 acted for the Chinese government in its financial embarrassments. He wrote "The Real Chinese Question"; "The Real Chinaman"; etc.

Holcroft, Thomas, an English dramatist; born in London, Dec. 10, 1745. By turn stable boy, school usher, journalist, and strolling actor, he began to write for the stage about 1778. "The Road to Ruin," the best of his many plays, was staged in 1792. At its London revival in 1873 it ran nearly four consecutive months. His "Tale of Mystery" (1802) brought into favor the melodrama, which has kept the stage ever since. He translated the "Mariage de Figaro" and other French and German plays. He left "Memoirs" pronounced by Thomas Moore the most interesting in the language. He died in London, March 23, 1809.

Holcus, a genus of grasses (order *Gramineæ*), extremely common in some pastures, where they are called soft grasses. Whether because of their innutritious quality, or of the soft hairs with which they are covered, they are neglected by cattle. *H. saccharatus* contains a large quantity of sugar, and *H. odoratus* is celebrated for its fragrance. There are only two species native to Great Britain, woolly soft grass or meadow soft grass (*H. lanatus*) and creeping-rooted soft grass (*H. mollis*), which are both perennial, growing about two feet high when in flower. *H. lanatus* is the only North American species.

Hold, the whole interior cavity or belly of a ship, or all that part of her inside which is comprehended between the floor and the lower deck throughout her length.

Holden, Edward Singleton, an American astronomer; born in St. Louis, Mo., Nov. 5, 1846; was graduated at Washington University in 1866, and at the United States Military Academy in 1870; Professor of Mathematics at the Naval Academy in 1873–1881; president of the University of California in 1883–1888; director of the Lick Observatory in 1888–1898; he was then appointed astronomer of the Smithsonian Institution. His publications include "Astronomy for Students" (with Simon Newcomb); "Monograph of the Central Parts of the Nebula of Orion"; "Astronomical Bibliography"; "Handbook of Lick Observatory"; "The Mogul Emperors of Hindustan"; etc.

Holden, Sir Isaac, an English inventor; born in Hurlet, England, May 7, 1807. While a worker in a cotton mill in Paisley, he fitted himself for the post of a teacher. He hit on the idea of putting sulphur under explosive material, which solved the problem of the lucifer match. Holden was not himself aware that lucifer matches had been made nearly two years before by John Walker, a chemist. While bookkeeper in a worsted mill, Holden became possessed with the ambition of inventing wool-combing machinery. After the expenditure of about $250,000 in experiments, Holden's wool-combing machinery brought him both fame and fortune. He was afterward a member of Parliament. He was made a baronet in 1893, and died Aug. 13, 1897.

Holder, Charles Frederick, an American naturalist; born in Lynn, Mass., 1851. He was assistant at the American Museum of Natural History, New York, from 1870 to 1877. He wrote: "Marvels of Animal Life"; "Wonder Wings"; "A Frozen Dragon, and Other Tales," a natural-history story-book for young people; "Life of Agassiz"; "Big Game at Sea"; etc.

Hölderlin, Friedrich (huhl'der-lin), a German poet; born in Lauffen-am-Necker, March 20, 1770. He was a profound Greek scholar, and an instructor at Jena, afterward private tutor. He was intimate with Goethe, Herder, and Schiller, the latter of whom influenced him strongly. Later he traveled in Holland, Switzerland, and France, showing on his return symptoms of mental decay which necessitated his being placed under restraint. "Hyperion, or the Hermit in Greece" (1797) is a brilliant story

in epistolary form; "Empedocles," an unfinished drama; and "Emily Before Her Bridal Day," a prose idyl. His translations of the "Antigone" and "Œdipus" are powerful, and faithful to the Hellenic spirit. Other works are: "German Men and Women," a series of studies; and several volumes of "Poems." He died in Tübingen, June 7, 1843.

Holding, the term in Scots law used to denote the manner in which heritable estate is holden, and corresponding to tenure in English law.

Hole, Samuel Reynolds, an English clergyman; born Dec. 5, 1819. He was ordained a curate in his native parish in 1844, became canon of Lincoln in 1875, and in 1887 was appointed to the deanery of Rochester. He did much to promote the influence of the Church of England as the Church of the poor, and advocated the principles of the Free and Open Church Association. As a lecturer he was well known to American audiences. Among his works are: "A Little Tour in Ireland" (1858), illustrated by John Leech; "A Book About Roses" (1869), an authority on the subject; "Nice and Her Neighbors" (1881); "Memories of Dean Hole" (1892). He died Aug. 27, 1904.

Holed Stones, the name given to a peculiar kind of prehistoric stone monument, presumably sepulchral. The size of the hole varies considerably — some being no larger than a dollar, others affording a passage for the human body. Their purpose is unknown. Fergusson speaks of the peculiarly binding nature of an oath sworn by persons joining hands through a holed stone; in Scotland libations are poured through holed stones in honor of Browny, the supposed guardian of bees; local superstition ascribes a curative property to the Men-an-tol, near Penzance, England, and people still creep through it in the hope of being cured of rheumatism.

Hole-in-the-Wall, a landmark, well known to seamen by this name, consisting of a natural perforation of the rock, at the S. E. extremity of the island of Abaco, one of the Bahamas.

Holi, Holee, or **Hooli,** the great Hindu spring festival, commencing on the full moon of the month Phalgun, and lasting for five days. It is meant to commemorate the gambols to which the god Krishna was addicted during his youth. The great amusement of the natives, who crowd the streets during the festival is to throw red powder, made of lac and flour, with rosewater, at each other. The tongue is allowed greater license than at other times, and much obscenity in word and action takes place, especially among such wild tribes as the Bheels around the village of Ahar. The Holi constitutes the Saturnalia of the Hindus. One of the Holi practices is to make what would be called April fools.

Holinshed, Raphael Ralph (hol'inshed), an English chronicler; descended from a family originally belonging to Cheshire, and lived in the age of Queen Elizabeth. He is best known by his "Chronicles of Englande, Scotlande, and Irelande," the first edition of which, known as the "Shakespeare edition," because it is the one which is supposed to have been used by him in collecting material for his historical plays, was published in London in 1577. In the preparation of this work Holinshed was assisted by several of the most learned men of the day. He died about 1580.

Hokitika, a town of New Zealand (South Island), capital of the province of Westland, and the principal place on the W. coast at the mouth of the Hokitika river. It owes its rise to being the center of the productive gold fields discovered in 1865. The town is well laid out and substantially built, the principal buildings being the town hall, the post and telegraph office, mechanics' institute, court house, several churches and schools, theater, banks, hospital, lunatic asylum, Westland Institute, etc. There is a good quay and other harbor works by which access from the sea has been greatly facilitated, but the place is not very progressive. There are breweries, a tannery, sawmills, and other manufacturing establishments. Pop. (1896) 2,064.

Holkar, a powerful Mahratta family, now in possession of the protected State of Indore in Hindustan. It was founded in the first half of the 18th century by a man of humble origin, a native of the town of Hol in the Deccan, from which circumstance the family name is derived. Having entered the army, he rose rapidly by his bravery and ability to the highest rank, married the cousin of the Rajah of the Mahrattas, took part in the invasion of Gujrat in 1721, and in recompense for his services received about 1736 the W. part of the province of Malwah, with the city of Indore for its capital. He died before 1770, and was succeeded after a short interval, during which his grandson held the throne, by his niece Aylah Bhyi, who conducted the internal administration of the kingdom with extraordinary success for which she is still revered by the people of Indore. She intrusted the military power to Takaji Holkar, who died in 1797, two years after Aylah Bhyi, whom he had succeeded in the government of the country. On his death he left two legitimate and two illegitimate sons, and after a civil war one of the latter, Jeswunt Rao Holkar, succeeded in 1801 in making himself master of the king-

dom. In 1804 and 1805 he carried on a vigorous war with the British, but was defeated and obliged to give up part of his territory. In 1811 he was succeeded by Mulhar Rao Holkar, who renewed the war with the British, but with no more success than his predecessor. He was totally defeated at Mehudpur in December, 1817, and in January, 1818, a British residency was established at Indore and his State put under British protection. During the Indian mutiny Mulkerji Rao Holkar, who had succeeded to the dominions of the family in 1852, endeavored to support the British, but owing to the mutinous disposition of his troops was able to render them no material assistance.

Holl, Frank (hōl), an English painter, son of Francis Holl, the engraver; born in London in 1845. He was a very successful student at the Royal Academy, and exhibited constantly from his student days. Among his best known pictures are "Faces in the Fire"; "Fern-Gatherers"; "No Tidings from the Sea"; "Leaving Home"; and "Gifts of the Fairies." Latterly he devoted himself to portraiture in which he greatly excelled, and painted many of the celebrities of the day. He died in 1888.

Holland. See NETHERLANDS, THE.

Holland, North (*Noordholland*), a province of the kingdom of the Netherlands, the greater part of which consists of a peninsula in the N. W., connected with the mainland by an isthmus less than 3 miles in breadth. It includes also a few islands to the N., and a portion of the mainland bordering on Utrecht and South Holland on the S. The total area is 1,070 square miles. The province of North Holland was formerly known as West Friesland. It lies very low, some portions of it, as Waterland, Kennemerland, and Purmerland, being at least partially below the level of the sea. A broad margin of downs and sand hills, often 180 feet high, protects it from the sea on the W. as far N. as the Helder, where the peninsula terminates. Artificial dykes have been constructed where this natural embankment ceases. For administrative purposes the province is divided into the four districts of Amsterdam, Haarlem, Alkmaar, and Hoorn. The means of internal communication are abundant, the principal of which, besides the rivers (Vecht, Drecht, Amstel, Zaan, etc.), roads, and railways, is the Great North Holland canal. About one-half of the province is estimated to consist of clover, grass, and hay land. In addition to these the chief agricultural products are wheat, rye, barley, oats, potatoes, pease, beans, etc. The province is poor in timber, the total area covered by woods amounting to no more than 24 square miles. On the other hand, the reeds and rushes which grow abundantly in some districts are of considerable importance. The keeping of bees receives a good deal of attention in some districts. Nurseries are numerous, especially in the neighborhood of Haarlem, Alsmeer, and Naarden. Butter is largely produced and exported. The wool trade also is considerable in this province, the chief wool markets being on the islands of Texel and Wieringen and at the town of Wieringenward, opposite the latter island. The chief manufacturing industries are carried on at Amsterdam and Haarlem, and on the Zaan, where there are numerous paper mills. The chief towns are Amsterdam, Alkmaar, Haarlem, Helder, and Zaandam. Pop. (1906) 1,069,682.

Holland, South (*Zuidholland*), the most populous province in the kingdom of the Netherlands, bounded on the N. by North Holland, on the E. by Utrecht and Gelderland, on the S. by North Brabant and Zeeland, and on the W. by the German Ocean. The S. part of the province is broken up into several islands. The area is 1,155 square miles. Like North Holland, it is a flat and depressed tract, and it also is protected from the sea on the W. by a margin of downs and sand hills extending to the mouth of the Maas on the S. For administrative purposes the province is divided into the six districts of Gravenhage, Leiden, Rotterdam, Dortrecht, Gorkum, and Briel. The chief river is the Rhine, with its numerous branches — the Leck, Linge, Merwede, Ijessel, Gouwe, and Rotte. The lakes were formerly numerous, but most of them are now drained. Besides the ordinary cereals and green crops, the chief agricultural productions are flax, hemp, and madder. The area of the hay and meadow land is above 600 square miles, or more than half the whole area of the province. The principal agricultural products are butter and cheese. Excellent vegetables are grown in the W., particularly around The Hague and Gouda, and great quantities are exported to England. Fruit trees and bushes are carefully cultivated in the W. part of the province, and their produce sent to all parts of the world. The manufacturing industry of the province is highly developed. The chief manufactures are those of bricks, gin (schiedam), and earthenware. Shipbuilding and the subsidiary arts are also carried on. The principal towns are Delft, Dortrecht (Dort), Gorinchem (Gorkum), Gouda, Leyden, Rotterdam, Schiedam, Gravenhage (The Hague), and Woerden. There is a university at Leyden which boasts of a matchless museum of natural history. Pop. (1906) 1,287,363.

Holland, a city in Ottawa Co., Mich., at the mouth of the Black river, on Lake Michigan, and on the Chicago and West Michigan, and the Detroit, Toledo, and Milwaukee railroads; 25 miles S. W. of Grand

Rapids. It is the seat of Hope College and the Western Theological Seminary, both institutions of the American Reformed Church, and has steamship connections with Chicago and other lake ports. It has breweries, manufactures of furniture, leather, baskets, etc., daily and weekly newspapers, electric lights, State banks, and an assessed property valuation of $4,000,000. Pop. (1900) 7,790; (1910) 10,490.

Holland, The, an American submarine torpedo boat; length, 55 feet; diameter, 10¼ feet; displacement, 75 tons; hull made of steel; motive power, gas engine at surface of water, and motor run by storage batteries, when boat is submerged. The offensive powers of the "Holland" are far greater than those of any other engine of war, whether ashore or afloat; that is, considering her size and methods of attack. The conning tower is the only part exposed when attacking the enemy. The "Holland" was officially tested in the lower bay of New York harbor, Nov. 12, 1898, before the United States Naval Board of Inspectors and Survey. For the first time the boat was directed by government officers, and the test was very successful. A torpedo was discharged under water, and the vessel went through a program of diving and running at full speed, and reversing while submerged. The "Fulton," a boat of similar construction, was officially tested, November, 1901, and its crew remained submerged for 15 hours without suffering the least inconvenience.

Holland, Frederick May, an American clergyman; born in Boston, May 2, 1836. He wrote: "The Reign of the Stoics" (1879); "Stories from Browning"; "Life of Frederick Douglass"; "Rise of Intellectual Liberty from Thales to Copernicus"; "Liberty in the Nineteenth Century"; etc. He died May 17, 1908.

Holland, Henry Richard Vassall Fox, Lord, an English publicist; born in 1773. He succeeded to the peerage by the death of his father when less than one year old. In 1798 he took his place in the House of Lords, and as the nephew of Charles James Fox, was at once acknowledged as a Whig leader. In 1806 he was commissioner for settling disputes with the United States; lord privy seal in 1806–1807; and chancellor of the duchy of Lancaster. He made Holland House the resort of the wit, talent, and beauty of his day. He died in 1840.

Holland, Sir Henry, an English physician; born in Knutsford, Cheshire, Oct. 27, 1788. He wrote "Travels in Albania," "Thessaly"; settled in London in 1816, and soon became one of the recognized heads of his profession. In 1828 he was elected a Fellow of the Royal College of Physicians; in 1840 he was appointed physician-in-ordinary to the prince consort, and in 1852 physician-in-ordinary to the queen. In the following year he was created a baronet. His "Medical Notes and Reflections," published in 1839, consist of 34 essays on various departments of medicine and psychology; it has passed through several editions. He died in London, Oct. 27, 1873.

Holland, Josiah Gilbert, an American author; born in Belchertown, Mass., July 24, 1819. He was graduated at the Berkshire Medical College, at Pittsfield, in 1844. He soon abandoned his profession, however, and after 15 months as a school superintendent at Richmond, Va., became assistant editor of the Springfield "Republican," of which he was part proprietor also from 1851 to 1866. In 1870 with Roswell Smith and the Scribners, he founded "Scribner's Monthly," which he conducted successfully till his death, Oct. 12, 1881. In this magazine appeared his novels, "Arthur Bonnicastle" (1873); "The Story of Sevenoaks" (1875); and "Nicholas Minturn" (1876). His "Timothy Titcomb's Letters" (1858) went through nine editions in a few months; and this sale was exceeded by his "Life of Lincoln" and his most popular poems, "Bitter Sweet" (1858); "Kathrina" (1867); and "The Mistress of the Manse" (1874).

JOSIAH G. HOLLAND.

Holland, Thomas Erskine, an English jurist; born in Brighton, July 17, 1835. He was educated at Oxford; was called to the bar in 1863; and in 1874 was elected Chichele Professor of International Law. He was a member of several foreign societies, and the recipient of honorary degrees from Oxford, Bologna, and Dublin. His monumental work is "The Elements of Jurisprudence" (1880), now in its eighth edition, which has become a text-book in most English and American universities. Among his other publications the most notable are: "An Essay on Composition Deeds" (1864); "The Institutes of Justinian" (1873); "The European Concert in the Eastern Question" (1885); "A Manual of Naval Prize Law" (1888), issued by authority of the Lords of the Admiralty,

and "Studies in International Law" (1898).

Hollar, Wenzel, or **Wenceslaus** (hōl'er), a Bohemian engraver; born in Prague about 1607. Among his numerous works, which are esteemed for their delicate, firm, and spirited execution, and which number some 2,740 plates, are a set of 28 plates, entitled "English Women's Ornaments," representing the dresses of Englishwomen of all ranks and conditions in full-length figures; Holbein's "Dance of Death"; etc. He died in London, in 1677.

Holleben, Theodore von, a German diplomatist; born in Stettin, Pomerania; was graduated at the universities of Heidelberg, Berlin, and Göttingen; entered the Body Guard Hussar Regiment; took part in the Franco-Prussian War, and distinguished himself during the siege of Paris and in the battles of Bapaume and St. Quentin. He entered the diplomatic service in 1872; was chargé d'affaires at Peking, China, in 1873–1874, and at Tokio, Japan, in 1875; minister at Buenos Ayres in 1876–1884; at Tokyo in 1885–1889; and at Washington, D. C., in 1892–1893; and ambassador to the United States in 1897–1903. At the command of Emperor William he, together with Secretary Hay, of the State Department, had charge of the arrangements for the official reception of the emperor's brother, Admiral Prince Henry, in February, 1902.

Holles, Denzil, Lord (hōlz), an English patriot; born in Houghton, Nottinghamshire, in 1599. He entered Parliament in 1624, and at once joined the party opposed to the king's government. On March 2, 1629, he was one of the members who held the speaker in his chair while resolutions were passed against Arminianism and tonnage and poundage. He was one of the members of Parliament whom Charles accused of high treason and attempted to arrest in 1642. He was a foremost leader of the Presbyterian party. For having in 1647 proposed to disband the army he was accused of high treason; but, leaving his native land, he found refuge in Normandy. After Cromwell's death, Holles set to work to effect the restoration of the Stuarts; he was the spokesman of the commission delegated to carry the invitation of recall to Charles at Breda. In 1661 he was created a peer as Lord Holles of Isfield in Sussex. His last important public duty was the negotiation of the treaty of Breda in 1667. He died Feb. 17, 1680.

Holley, Alexander Lyman, an American metallurgist; born in Lakeville, Conn., July 20, 1832; was graduated at Brown University in 1853; became editor of "The Railroad Advocate" in 1856, and soon changed its name to "The American Engineer." About 1863 he went to England and purchased for Corning, Winslow & Co. the Bessemer patents for the manufacture of steel. The first Bessemer works were built by him in Troy, N. Y., in 1865, and the second plant in Harrisburg, Pa., in 1867. He was Lecturer on the Manufacture of Iron and Steel at Columbia University in 1879–1882. Holley secured about 16 patents, of which the most important was probably that for the detached converter-shell, an improvement in the Bessemer process. His publications include "The Permanent Way and Coal-burning Locomotives of European Railways, with a Comparison of the Working Economy of European and American Lines, and the Principles Upon Which Improvement Must Proceed" (with Zerah Colburn, 1858); "American and European Railway Practice" (1860); "A Treatise on Ordnance and Armor" (1865); etc. He died in Brooklyn, N. Y., Jan. 29, 1882. A colossal bronze bust of him has been placed in Washington Square Park, New York city, as a testimonial from the mechanical engineers of the United States and Europe.

Holley, Marietta, an American author; born in Ellisburg, N. Y., in 1844. The most noted of her works are: "My Opinions and Betsey Bobbet's," and "Josiah Allen's Wife," and the "Samantha" series, all of which had an extensive sale.

Hollingshead, John, an English journalist; born in London, Sept. 9, 1827. He was a constant contributor to "Household Words," "All the Year Round," etc. In 1868 he became lessee and manager of the Gaiety Theater, and afterward controlled many theatrical enterprises in London and the provinces. Besides original and adapted plays, his works include: "Under Bow Bells"; "Rubbing the Gilt Off"; "Ragged London"; "Stories and Essays"; "Footlights." He died Oct. 10, 1904.

Hollister, Gideon Hiram, an American lawyer; born in Washington, Conn., Dec. 14, 1817. His home was in Litchfield, Conn. He was minister to Haiti in 1868–1869. He wrote: "Mount Hope" (1851), a historical romance; "History of Connecticut" (2 vols. 1855); "Thomas à Becket, a Tragedy; and Other Poems" (1866); and "Kinley Hollow" (1882), a novel, published posthumously. He died in Litchfield, March 24, 1881.

Holloway, Mrs. Laura (Carter), an American author; born in Nashville, Tenn., Aug. 22, 1848. She was for 12 years associate editor of the Brooklyn "Daily Eagle." She wrote: "Ladies of the White House"; "The Mothers of Great Men and Women, and Some Wives of Great Men" (1883); "The Home in Poetry" (1884); "Chinese Gordon" (1885); "An Hour with

Charlotte Brontë"; "The Buddhist Diet Book"; etc.

Holloway, Thomas, an English philanthropist; born in 1800. He was proprietor of popular pills, ointment, etc. He founded a sanatorium or asylum for the insane, and hospitals for incurables and convalescents, at Egham, Surrey, in 1873; and also at the same place the Royal Holloway College, designed to supply the best and most suitable education for women of the middle classes. The college, which was opened by Queen Victoria in 1886, contains a collection of pictures of the value of $500,000. The total cost of the two institutions was $5,000,000. He died in 1883.

Hollow Ware, the trade term for all kinds of vessels made of cast or wrought iron, and used for cooking and other purposes.

Holly, in botany, *Ilex aquifolium*, a shrub or small tree, 10 to 40 feet high, with glossy leaves, the lower ones uniform, with waved spinous cartilaginous margins, the upper ones sometimes entire; flowers in umbellate cymes, white, often subdiœcious; fruit a scarlet or more rarely a yellow drupe, with four bony furrowed stones. Wild in Europe, and Western Asia. The beautiful white wood of the holly is valued by cabinet-makers for inlaying, the bark is used in the manufacture of birdlime, the berries are so violently purgative that six or eight will excite violent vomit; the leaves are said to be equal to Peruvian bark for the cure of intermittent fevers. Haller recommends that their juice should be given in icterus. The root and bark are said to be emollient, resolving, expectorant, and diuretic. The leaves and berries form, with ivy, the principal material of Christmas decoration. The cape-holly is *Crocoxylon excelsum*, the knee-holly, *Ruscus aculeatus*, the mountain-holly, *Nemopanthes*, and the sea-holly, *Eryngium maritimum;* South American holly, *Ilex paraguensis*. The North American holly is the *Ilex opaca*, found along the entire Atlantic coast of the United States.

Holly, James Theodore, an American clergyman; born in Washington, D. C., Oct. 3, 1829. The son of Roman Catholic (colored) parents, he withdrew from the Catholic Church, and entered the Protestant Episcopal Church in 1851. He studied for the priesthood; was ordained, and in 1856 became rector of St. Luke's, New Haven, Conn. In 1874 he became Episcopal missionary bishop of Hawaii.

Hollyhock, a biennial plant (*Althœa rosea*), order *Malvaceæ*. It is a native of China, and is a frequent ornament of gardens. There are many varieties, with single and double flowers, characterized by the tints of yellow, red, purple, and dark purple approaching to black. It reaches a height of eight feet or more.

Holly Oak, in botany, *Quercus ilex*, called also the holy oak or common evergreen oak. It is found in the S. of Europe, in the vicinity of the sea, with leaves varying in form, some of them prickly, others entire on the margins. It does not form forests. Its wood is good, but very hard and heavy.

Holman, James, an English traveler; born about 1787. Entering the navy in 1798, he had risen to be a lieutenant when, in 1810, the loss of sight compelled him to quit the service. Yet, being of an active temperament, he in 1819–1821 traveled through France, Italy, and the countries touching on the Rhine. Encouraged by this, he conceived the plan of traveling around the world, and had penetrated to Irkutsk in Siberia, when he was arrested as a spy by the Russian government and carried back to the frontiers of Poland. Nevertheless, undaunted by this failure, he again set off in 1827, and this time effectively accomplished his purpose. Finally, he visited the countries of Southeast Europe. He published "Journals" of his successive journeys, which contain much more useful information than could be expected from the circumstances under which it was gathered. He died in London, July 29, 1857.

Holmes, Abiel, an American Congregational clergyman; father of Oliver Wendell Holmes; born in Woodstock, Conn., Dec. 24, 1763. He was pastor of the First Church, Cambridge, Mass. He wrote: "Life of Ezra Stiles" (1798); "Annals of America" (enlarged ed. 1829), a work of enduring value; "Memoir of the French Protestants"; etc. He died in Cambridge, Mass., June 4, 1837.

Holmes, Mrs. Mary Jane (Hawes), an American novelist; born in Brookfield, Mass. A voluminous writer, her works are mostly domestic in character, and have had a large circulation. Among them are: "Tempest and Sunshine" (1854); "Lena Rivers" (1856); "Marian Gray" (1863); "Milbank" (1871); "Queenie Hetherton" (1883); etc. She died Oct. 6, 1907.

Holmes, Oliver Wendell, an American author; born in Cambridge, Mass., Aug. 29, 1809. He was graduated at Harvard. He began the study of law, but in a short time relinquished it for that of medicine. In 1839 he became Professor of Anatomy and Physiology in Dartmouth College, N. H., but resigned after two years' service in order to devote himself to practice in Boston. In 1847 he was appointed to the chair of anatomy at Harvard, a position which he filled till 1882. He wrote voluminously both in prose and verse, and shone as a prominent figure in the famous group asso-

ciated with the "Atlantic Monthly." His most original work is "The Autocrat of the Breakfast Table," which first appeared in the "Atlantic Monthly." This professes to be the table talk of the "Autocrat" (who lives in an American boarding house), and the plan gives the author scope for touching on topics of the most varied character in a vein at times serious, at times humorous or witty, but always striking and original, while poems of high excellence are also interspersed. The "Professor at the Breakfast Table" and "The Poet at the Breakfast Table" are two works of a similar character and in their way only less successful than the "Autocrat." Two rather remarkable novels also proceeded from his pen: "Elsie Venner, a Romance of Destiny," and "The Guardian Angel." Among collective volumes of his poems are: "Songs in Many Keys"; "Songs of Many Seasons"; "The Iron Gate"; and "Before the Curfew." The poet's lyric entitled "Old Ironsides," written when the breaking up of the frigate "Constitution" was contemplated, became very popular and saved the famous vessel from destruction. Among his prose works are: Three medical essays that gained the Boylston prize; "Lectures on Homeopathy"; "Currents and Counter Currents in Medical Science"; "Border Lines in some Provinces of Medical Science"; "Mechanism in Thought and Morals"; "Memoirs" of Motley and Emerson; "A Mortal Antipathy"; and "Our Hundred Days in Europe," a bright record of a short visit made in 1886, on which occasion the universities of Oxford, Cambridge, and Edinburgh conferred honorary degrees on the writer. He died Oct. 8, 1894.

Holmes, Oliver Wendell, Jr., an American jurist; son of Dr. Oliver W. Holmes; born in Boston, Mass., March 8, 1841; was graduated at Harvard College in 1861; associate justice of Massachusetts Supreme Court, 1882–1899; chief-justice, 1899–1902; then associate justice United States Supreme Court.

In 1882 Governor Long appointed Colonel Holmes, then Professor of Law in Harvard Law School, to be an associate justice of the Supreme Judicial Court of Massachusetts. In 1898 Governor Wolcott appointed him chief-justice. Previous to his original appointment he had been a practising attorney of distinction in Boston, a soldier, scholar, legal writer, and scientist. In early life he was equipped with the best advantages education and refined social environment could give. He had hardly been awarded his degree at Harvard in 1861 when he enlisted in the 20th Massachusetts regiment. When he was wounded at Antietam, Sept. 17, 1862, he was a captain in his regiment. When he was mustered out he was a brevet lieutenant-colonel. Returning from the war, Colonel Holmes took up the study of the law and soon after was admitted to the bar. He edited the 12th edition of "Kent's Commentaries," since recognized as the standard edition of the famous work. His alma mater has showered many honors on him, and in 1886 Yale conferred on him the degree of Doctor of Law. Possessed of strong powers for diagnosis and analysis, his studies have been wide and varied and he is in the broadest sense a scholar. He has not adopted the easy course of following legal rules merely because they exist as such without first tracing out their history and origin and their relation to the matter in hand. His opinions which run through the last 45 volumes of the Massachusetts reports are expressed in a fine literary style peculiarly his own and they occasionally sparkle with wit. He has generally reasoned and explained the law of the case in hand, citing such cases as may have had relation to it without copying in a wholesale manner general rules. His opinions are almost always brief, and they are generally with celerity. He does not hesitate to make a precedent when he has none to follow, and laboring men have had occasion more than once to praise him for his decisions in cases involving their interests. He thinks that workingmen may combine for getting the most they can for their labor, just as capital may combine with a view of getting the greatest possible return.

"It must," he says, "be true that when combined they have the same liberty that combined capital has to support their interests by arguments, persuasion, and the bestowal or refusal of those advantages which they otherwise lawfully control, so long as they do no violence or threaten no violence."

It was in the Vegelahn *vs.* Gunter case in the 168th Massachusetts reports that he took this stand. The question before the full court merely was whether the defendants, who were union upholsterers on strike, had a right to maintain a patrol of two men walking up and down the sidewalk in front of the plaintiff's shop and speaking to those desirous of entering the shop. There had been a temporary injunction issued by Judge Morton, which restrained, among other things, the maintenance of the patrol, and upon a final hearing on the merits of the case Judge Holmes had substantially followed the previous injunction, except that the patrol was not stopped; so as to all things except the patrol there was no question.

The majority of the court held, however, that the patrol was a part of a conspiracy to interfere with the plaintiff's business until he adopted the defendant's schedule of prices in combination with persuasion, social pressure, and threats of personal injury or unlawful harm conveyed to his em-

ployes and those seeking employment under him, which amounted to a private nuisance which a court of equity would stop by injunction.

The late Chief-Justice Field and Justice Holmes dissented from so much of the opinion as required an injunction against the patrol, dissociated from threats of physical injury to person or property and any combined attempt to injure the business, though without such threats and irrespective of the means employed. But since that decision the English House of Lords has leaned Justice Holmes' way in its decision in the case of Allen *vs.* Flood.

Justice Holmes thinks that every time a judge declines to rule whether certain conduct is negligent or not he shows his inability to state the law. As a scientist of the law he has many personal opinions, the result of long investigations, regarding the history and origin of legal ideas, many of which have been approved of by the Supreme Court of his State, as well as by the highest courts of other States and countries.

Holmes, William Henry, an American geologist; born near Cadiz, Ohio, Dec. 1, 1846. He was graduated at the McNeely Normal College in 1870 and in 1871 became connected with the Smithsonian Institution. In 1872 he was made an assistant on the geological survey and acted as artist for the Hayden expedition to the Rocky mountains. He afterward served under Maj. Powell. In connection with his illustrations prepared for government reports, Prof. Holmes won a reputation as a water color artist. For the purpose of archæological study, he made a visit to Mexico in 1882, and in 1889 he was appointed to supervise the archæological explorations of the bureau of ethnology. In 1892 he became Professor of Archæological Geology in the University of Chicago. The "Atlas of Colorado" and some other volumes of the geological survey were edited by Prof. Holmes. He is an authority on the subject of aboriginal art.

Holocaust (hol'ō-câst), a sacrifice, the whole of which was consumed by fire, nothing being retained; such sacrifices were practised by the Jews. The word is now sometimes applied to a general sacrifice of life or slaughter.

Holograph, any writing, as a letter, deed, will, or document, wholly written by the person from whom it proceeds. In Scots law a holograph deed is valid without the signatures of witnesses, but in English law every deed, whether holograph or not, must have the names of two witnesses attached to it to render it valid.

Holoptychius (hol-op-tik'ē-us), an extinct genus of ganoid fishes from Devonian and Carboniferous strata, type of a family the members of which are remarkable for their sculptured or wrinkled scales and extraordinary labyrinthine tooth structure.

Holothuria (hol-ō-thö'rē-ä), the type of an order of Echinoderms, the *Holothurioidea* or sea-cucumbers. This order is destitute of the calcareous plates typical of the class, but has a leathery integument open at both ends, and pierced by orifices through which suctorial feet or ambulacra protrude. They have the mouth surrounded by tentacula; a long convoluted alimentary canal; respiratory organs near the anus, and generally in the form of two branching arborescent tubes (forming "the respiratory tree") into which the water is admitted; and the organs of both sexes in each individual. They are capable of extending themselves to several times the length they have in a state of repose, and of extraordinary reproduction of parts, even of vital organs. The young undergo a metamorphosis during development. They abound in the Asiatic seas, the bêche-de-mer or trepang being a member of the family.

Holst, Hans Peter (hōlst), a Danish poet; born in Copenhagen, Oct. 22, 1811. He was made Professor of Language and Literature at the Copenhagen Academy, 1836, and traveled through Europe later at government expense. His writings are exceedingly varied, elegant, and tasteful. The "Poem in Memory of Frederic IV.," "Recollections of Travel," "Poems," and "National Legends," represent his early work. "Gioacchino," a drama of merit; "Sicilian Types and Characters," a sketch of scenery and manners; and "Eros," a collection of lyrics, have also spread his fame. He died June 2, 1893.

Holst, Hermann Eduard von, a German-American historian; born in Fellin, Livonia, Russia, June 19, 1841. Coming to the United States in 1866, he engaged in literary work and lecturing; he returned to Europe, becoming professor in the universities of Strasburg (1872) and Freiburg (1874); appointed Professor in the University of Chicago (1892), he came to this country again. He was author of: "Constitutional and Political History of the United States"; "Lives" of John

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C. Calhoun and John Brown; "Constitutional Law of the United States"; "The French Revolution Tested by Mirabeau's Career"; etc. He died Jan. 20, 1904.

Holstein (hōl'stīn), a duchy of Germany, formerly belonging to Denmark, and now an appanage of the kingdom of Prussia. By decree of Jan. 1, 1869, the duchy of Holstein was united to the duchy of Schleswig, to form the province of Schleswig-Holstein. Pop. (1900) 1,387,968.

Holstein, a princely German family, which includes the royal line of Denmark, the collateral branches of Holstein-Sanderburg-Augustenburg, and the ducal race of Holstein-Gottorp, which last is again divided into two branches — the elder being the reigning line of Russia, while the younger is represented by Gustavus, Prince of Wasa, a field marshal in the Austrian service, and also by the Oldenburg family.

Holsten, Karl Christian Johann (hōl'sten), a German theologian; born in Mecklenburg-Schwerin, March 31, 1825. He studied theology and philology at Leipsic, Berlin, and Rostock, and became in 1852 a teacher at the Rostock gymnasium. In 1870 he was called to the Bern High School as an extraordinary professor; next year became ordinary professor, and in 1876 obeyed a call to a similar post at Heidelberg. His startling contribution to Pauline theology, "Gospel of Peter and Paul," was followed by many others of value.

Holston, a river which rises in Wythe co., Va., and flowing a tortuous S. W. course through Smythe and Washington counties, enters Tennessee between Hawkins and Powell counties. Thence traversing Granger, Jefferson, and Knox counties, it unites with the Clinch river at Kingston in Roane county, to form the Tennessee river; length, about 200 miles.

Holtei, Karl von (hol'tī), a German dramatist; born in Breslau, Jan. 24, 1798. After serving in the campaign of 1815, and going through the university, he became an actor at Breslau, and married the noted actress Louise Rogée. He then essayed dramatic authorship, his "Viennese in Berlin" and "Berliners in Vienna," meeting with great success. Not long after appeared the dramas: "The Old Commander"; "Lenore"; "The Tragedy at Berlin"; "Poor Peter"; and plays founded on Shakespeare's life. His wife dying, he married another actress, and continued his work in connection with the stage; and also began reading in public. Two volumes of poems, also "Silesian Poems," "German Songs," "Voice of the Forest," and others, extended his renown. His popular novels include: "The Vagabonds"; "Christian Lammfell"; and "Noblesse Oblige." He died in Breslau, Feb. 12, 1880.

Hölty, Hermann (hel'ty), a German poet; born in Ülzen, Hanover, Nov. 4, 1828. He became a clergyman, and held various pastorates in Hanover. His "Songs and Ballads," "Alpine Charms," "From the German Olympus," and various other volumes, have given him his place in literature. He is a pleasing poet. He died in Rehburg, Aug. 16, 1887.

Hölty, Ludwig Heinrich Christoph, a German elegiac poet; born in Mariensee, near Hanover, Dec. 21, 1748. He was always physically delicate. "The Fall of the Leaves" shows his attractive if slightly effeminate Muse to perfection. "Faith and Candor Ever," an elegy to a country maiden, is a spiritual expression of love. The consciousness that he was destined to an early death infused into his song a rarely pensive note. He died in Hanover, Sept. 1, 1776.

Holy Alliance, a league proposed by Alexander I., Emperor of Russia, Sept. 26, 1815, after the defeat of Napoleon at Waterloo had cleared the way for the execution of his desire of establishing a settled peace in Europe. Alexander, Francis of Austria, and Frederick William III. of Prussia, signed with their own hands and without the countersign of a minister the act establishing this alliance, which is said to have been in the handwriting of the first. It was not wholly published till Feb. 2, 1816, when the text was given in full in the Frankfort "Journal." It consisted of a declaration that in accordance with the precepts of the Gospel of Jesus Christ the principles of justice, charity, and peace should be the basis of their internal administration, and of their international relations, and that the happiness and religious welfare of their subjects should be their great object. It was also stipulated that the three sovereigns should invite others to become members of the Holy Alliance. In Russia and Germany its principles were not discussed except in a spirit of eulogy, but they were uncompromisingly condemned in Great Britain by many of her foremost statesmen. On Feb. 4, 1823, both Lansdowne and Brougham openly condemned its doctrines in their places in Parliament. Sir James Mackintosh said of the doctrine of legitimacy, in the sense in which it was used by the Holy Alliance, "Sophistry lent her colors to the most extravagant pretensions of tyranny." The events of 1848 broke up the Holy Alliance. It had previously lost much of its authority from the death of Alexander and the French revolution of 1830.

Holy City, an appellation given by different peoples to that particular city whence proceed all their religious traditions and worship. By Jew and Christian, Jeru-

salem is so named; by Catholics, Rome; by Mohammedans, Damascus, Mecca, and Medina; by the Hindus, Benares; by the Mohammedans of India, Allahahad; by the ancient Incas, Cuzco.

Holy Coat, a coat, alleged to be the seamless vestment worn by Jesus at His trial, and for which, after His crucifixion, the soldiers cast lots (John xix: 23, 24). Several exist, the custodians of each claiming that it is the genuine one. The exhibition of one of them at Treves, in 1844, and the actual worship of the coat by some of the pilgrims who resorted thither in multitudes, led to a small secession from the Roman Church, headed by two priests, Ronge and Czerski. The tendencies of Ronge were toward rationalism, those of Czerski toward evangelical Protestantism. Neither rose to much power.

Holy Cross, the alleged actual cross on which Christ suffered. Rufinus, Socrates, Sozomen, Theodoretus, and others, relate the discovery (about A. D. 326) by Helena, mother of Constantine, of three crosses, with the inscription in Greek, Hebrew, and Latin. The question which of the three was the cross of Jesus was satisfactorily settled when, on the suggestion of Macarius, Bishop of Jerusalem, trial was made which could work miracles, and it was found that only one had this power. Eusebius, who was well acquainted with the parties concerned, seems never to have heard of these alleged discoveries.

Holy Cross, an order of Augustinian canons, suppressed in the 17th century. Also a religious order established in 1834 in France. The members devote themselves to education and works of mercy, the brothers teaching boys trades, agriculture, etc., the sisters educating girls and visiting the sick. Also a society consisting of clerical members of the ritualistic school of the English Church. It was founded in 1855.

Holy Cross College, an educational institution in Worcester, Mass.; founded in 1843 under the auspices of the Roman Catholic Church; has grounds and buildings valued at $500,000; endowment, $40,000; volumes in the library, 36,000; ordinary income, about $100,000; average number of faculty, 35; average student attendance, 450; graduates, about 1,200.

Holy Cross Sisterhood. See SISTERHOODS.

Holy Family, the infant Saviour, the Virgin Mary, Joseph, Elizabeth, Anna, and John the Baptist. A picture in which all or the most of the subordinate personages are introduced is called a "holy family."

Holy Fire, a flame at Jerusalem maintained by the Greek and Armenian priests to be miraculous. At the time of its expected appearance, the Church of the Holy Sepulcher is crowded, and the eagerness to light torches and candles when the sacred fire first appears is so great that it requires great energy on the part of the Mohammedan police to keep a semblance of order, and even then people are at times trampled to death. The liberality of the devotees is much excited by the alleged miraculous enkindling of the holy fire.

Holy Ghost, the Holy Spirit; the third person in the Trinity, whom the Saviour promised to send to comfort His disciples, (John xiv:, xv:, and xvi.). The doctrine of the "Filioque," asserting the "Procession" from the Father and the Son, formed one of the chief points of dispute which led to the separation of the Greek and Roman Churches — the former contending that he proceed from the Father only. The Presbyterian Church maintains the doctrine held by the Roman Catholic Church.

Holy Ghost, Order of, an order of male and female hospitallers, founded by Guy, son of William, Count of Montpellier, toward the end of the 12th century, for the relief of the poor, the infirm and foundlings. After the middle of the 18th century it was united with the order of St. Lazarus by Clement XIII. This was also the name of the principal military order in France instituted in 1578 by Henry III., abolished in 1789, revived at the Restoration, and again abolished in 1830.

Holy Ghost Plant, a tropical flower growth. In Mexico, Central and South America, and in some parts of Cuba and Jamaica this beautiful plant grows in great profusion. This plant, also known as the botanical dove, is called the Holy Ghost plant on account of the shape of the flower, which has the appearance of a dove with expanded wings hovering over the stalk. The entire flower, which is pure white, opens from the end of a long green stem and is very fragrant.

Holy Grass (*Hierochloe borealis*), a sweet-smelling grass belonging to the tribe *Phalaridœ*, about a foot high, with a brownish glossy lax panicle. It is sometimes strewed on the floors of churches on festival days, whence its name.

Holyhead, an island and seaport of Wales; off the W. coast of the Isle of Anglesey, with which it is connected by a long causeway which may be crossed at low water, 23 miles N. W. of Bangor. The isle is a barren rock. Holyhead has a breakwater enclosing a harbor.

Holy Innocents' Day. See CHILDERMAS.

Holy Island, a name for Ireland, from the number of saints in its calendar. Also Guernsey, one of the Channel Islands, be-

cause of the monks that formerly flocked thither. Also the island of Rügen, so named by Varini. Also a name now generally given to Lindisfarne, on the coast of Northumberland, where the famous St. Cuthbert ruled over a Saxon abbey founded 635. It is a peninsula insulated at high tide.

Holy Land, a name generally given among modern peoples to Palestine, the scene of the Christ's birth, ministry, and death. It is first applied in Zech. ii: 12. Elis, a kingdom of ancient Greece, was also so named. Here was the temple of the Olympian Zeus, and sacred games were held every four years. Arabia is so named by Mohammedans because Mohammed was born there. The Buddhists of China call India the Holy Land, because it was the country of Sakya Muni.

Holy League, a league, founded in 1576, to prevent Henry of Navarre, who at the time was a Protestant, from ascending the French throne. At his becoming a Roman Catholic, in 1593, the league was dissolved and he became king under the title of Henry IV. The name was also given to a combination formed in 1508 by Pope Julius II. with Louis XII. of France, Maximilian of Germany, Ferdinand III. of Spain, and some Italian princes, against Venice.

Holy Maid of Kent. See BARTON, ELIZABETH.

Holy Mountain, a name given by modern Greeks to Mount Athos. The flanks of this eminence are dotted with 22 convents, besides a number of chapels, cells, grottoes, caves, etc., the abodes of over 3,000 monks and hermits. It was the convents of Mount Athos that yielded to the libraries of Europe so many priceless MSS., the masterpieces of ancient literature.

Holyoake, George Jacob, an English religious reformer; born in Birmingham, April 13, 1817. He was educated at the Mechanics' Institute in his native city, and figured as teacher, journalist, and lecturer. He is chiefly known for his advocacy of secularism and coöperation. His works include: "Secularism" (1854); "Life of Robert Owen" (1859); "The Limits of Atheism" (1861); "History of Coöperation" (1875–1879); "Among the Americans" (1881); "A Hundred Days in New Mexico and Canada"; "Coöperative Movement of Today"; "Nature and Origin of Secularism"; etc. He died Jan. 22, 1906.

Holy of Holies, in Judaism, the inner or most sacred apartment, first to the Tabernacle, then of the Temple, into which none was permitted to enter but the high priest, and he only once a year, and then "not without blood." It was separated from the Holy Place or Outer Chamber by a veil.

Holyoke, a city in Hampden co., Mass., on the Connecticut river, and on the Boston and Maine, and the New York, New Haven, and Hartford railroads; 8 miles N. of Springfield. It is the leading paper manufacturing city in the world, with a daily output of over 200 tons. The Connecticut at this point is dammed with a dam 1,000 feet in length, supplying water-power, through a system of canals, to the numerous turbines, by which nearly all the mills are operated. The principal manufactures include paper, cotton and woolen goods, machinery, turbines, thread, knit goods, steam engines and wire. The city is lighted by gas and electricity; has water-works, public schools, high school, public library, electric street railroads, daily and weekly newspapers, 5 National banks, with $1,250,000 capital, and an assessed property valuation of nearly $40,000,000. Pop. (1900) 45,712; (1910) 57,730.

Holyoke College, Mount. See MOUNT HOLYOKE COLLEGE.

Holyoke Mount, in Hampshire co., Mass., between Hadley and Amherst on the N. and South Hadley and Granby on the S. one mile E. of the Connecticut river, three miles S. E. of Northampton. It is a steep, narrow ridge of green-stone; highest point 1,120 feet above the sea.

Holy Places, the sites in Palestine connected with the ministry and death of Christ, especially those traditionally located within the Church of the Holy Sepulcher. The Greek and Latin Churches both claim the custody of these sacred spots, the Russians supporting the pretensions of the former, the French those of the latter. A dispute about these holy places led, in 1853, to the Russo-Turkish War, followed, in 1854, by the Crimean War.

Holy Roman Empire, a title which the German Empire received in 902 when Otho I. was crowned at Rome by Pope John XII. It came to an end when Francis II. became hereditary emperor of Austria in 1804.

Holy Rood, a cross or crucifix; especially one placed on the rood-beam in churches over the entrance to the chancel.

Holy rood day is a festival kept on Sept. 14, in commemoration of the exaltation of the Saviour's Cross. Also called holy cross day.

Holyrood, a palace and abbey, in Edinburgh, at the E. extremity of the old town. The abbey church, founded in 1128 by David I., containing the royal vault, with the ashes of numerous members of the Scottish royal race, is now mostly in ruin. The palace is a large quadrangular building of hewn stone, with a court within surrounded by a piazza. It was erected in successive parts from 1501 to 1679, contains the private

royal apartments in modernized condition, the rooms associated with the events in the reign of Mary Queen of Scots, and a gallery 150 feet long, in which are portraits of all the Scottish kings, most of them imaginary. The abbey and its precincts possess the privilege of sanctuary for insolvent debtors, but the class of debtors entitled to sanctuary has been so restricted by recent legislation that the institution may be looked on as obsolete.

Holy Sepulcher, the sepulcher in which the body of Jesus was laid between His death and His resurrection. Also the Byzantine Church, built at Jerusalem on what is by some believed to be the site of the sepulcher. The Order of the Holy Sepulcher is an order founded by Godfrey of Bouillon, the commanding chief, revived by Pope Alexander VI., in 1426, and reorganized in 1847 and 1868.

Holy Synod, a council established at St. Petersburg to act for the Emperor of Russia in ecclesiastical affairs, he being the earthly head of the Greek Church in Russia. The first president was Stephen Javorski, in the 17th century.

Holy Thursday, in the English Church, Ascension Day; in the Roman Church the Thursday in Holy-week, Maundy-Thursday. Its title to sancity is that on that day what the Roman and Greek Churches consider the Sacrifice, and the English Church and Dissenters the Sacrament of the Eucharist, was instituted.

Holy Water, in the Roman Catholic Church, water which has been blessed, or consecrated, by an appropriate service, and used to sprinkle the worshipers and the things used in the church. The custom of sprinkling churches, etc., with consecrated water is traced by some to the time of the Apostles, Pope Alexander I. (109–119) refers to it as an established custom in his time; and it is mentioned by Tertullian (160–240).

Holy Week, or **Passion Week,** the week which immediately precedes Easter, and is devoted especially to commemorate the passion of our Lord. The days more especially solemnized during it are Spy Wednesday, Maunday Thursday, Good Friday, and Holy Saturday. It is an institution of very early origin, and is known as Great Week, Silent Week, Penitential Week, etc. Spy Wednesday was a name given in allusion to the betrayal of Christ by Judas Iscariot. Maundy or Holy Thursday specially commemorates the institution of the Eucharist.

Holywell, a borough in Flintshire, North Wales, on the estuary of the Dee, 17 miles from Liverpool. It takes its name from the well of St. Winifred, one of the most copious springs in Great Britain, long a famous resort for the supernatural cure of bodily disease and infirmity. The well is covered by a small Gothic building of early date. Near the town are coal and lead mines, and quarries.

Holy Wells, a designation of a sanctified spring or source of water. In very many forms of faith water plays an important part, and is invested with miraculous powers. In the Old Testament we have the cleansing of Naaman in the Jordan (II Kings v.); in the New, the man "blind from his birth," who "washed and came seeing" (John ix.), and the "troubling of the water" (John v.). Horace and Ovid speak of sacrifies to holy wells, and Juvenal mentions the oracular fountain of Jupiter Ammon. When Paganism was yielding to a purer faith, laws were passed forbidding the old adoration at fountains, but Tylor says, "With a varnish of Christianity, and sometimes the substitution of a saint's name, water worship has held its own to our day." St. Winifred's Well, at Holywell, Flintshire, has still many votaries; Ireland and Scotland can show their holy wells in scores of parishes, and in the latter country some bush adjacent, bedecked with rags, testifies to the survival, in a mutilated form, of the rite of sacrifice. Bishop Hall bears witness to a cure wrought upon a cripple by the waters of St. Madern's Well, and the virtues of the "water which sprang forth under the hands of Bernadette at the command of the Virgin Mary" are boldly asserted by that Parisian journalist, who claims to be one subject among many of its miraculous efficacy.

Holywood, John. See SACROBOSCO, JOANNES DE.

Homage, in feudal law, a formal acknowledgment made by a feudal tenant to and in presence of his lord on receiving the investiture of a fief or coming to it by succession, that he was his vassal. The tenant, being ungirt and uncovered, kneeled and held up both his hands between those of the lord, who sat before him, and there professed that "he did become his man, from that day forth, of life and limb, and earthly honor," and then received a kiss from his lord.

Homburg (hom′bŏrg), a town of Prussia, and the former capital of the landgraviate of Hesse-Homburg; at the foot of the Taunus Mountains, 9 miles N. W. of Frankfort-on-the-Main. It has been much frequented on account of its mineral waters; but since the suppression, in 1867, of its celebrated gambling hall, it is comparatively deserted. Pop. (1905) 13,742.

Home, the name of one of the oldest and most celebrated of the historic families of Scotland. Their extensive estates dwindled down to a patrimony of 2,000

acres, and they sank into insignificance. But the marriage (1832) of the 11th earl to the heiress of the Douglas estates restored the decayed fortunes of this ancient house. These estates now, according to the Doomsday Book, yield a rental of $238,605 a year.

Home, Daniel Dunglas, a Scotch spiritualist; born near Edinburgh, March 20, 1833. He was taken by an aunt to the United States, where by 1850 he had become a famous medium. He began the study of medicine, but was persuaded by his friends to practise spiritualism instead; and in 1855 he removed to London to carry on his "mission." He made many converts,

HOMER.
From an ancient statue.

though not all the great people he claimed. He was presented at several courts, and to the Pope; and he joined the Roman Catholic Church, but was ultimately expelled for spiritualistic practices. He published two series of "Incidents of my Life" (1863 and 1872), and "Lights and Shadows of Spiritualism" (1877). He died in Auteuil, June 21, 1886.

Home, Henry. See KAMES, LORD.

Home, John, a Scotch clergyman and dramatic poet; born in Leith in 1722. His tragedy of "Douglas" was performed at Edinburgh in 1756, and attained a wonderful popularity, which has not yet disappeared. He died in Edinburgh in 1808.

Homer, a poet of ancient Greece, whose birthplace and date are entirely unknown. It is not even known that the poet to whom the Homeric writings are attributed bore the name Homer. His residence, age, and personality are nowhere made known in his poems. Seven cities or more, of ancient Greece, claimed him as a native, and he is generally conjectured to have lived between 1000 B. C. and 700 B. C. He was reputed to have been blind, but the so-called Homeric hymn, from which the legend of him is inferred, is now held to have been of a much later date than the "Iliad" and "Odyssey." These last-named poems were commonly known as Homer's from a very early period, and were regarded, till the development of modern criticism, as complete homogeneous productions of one pen. In 1795, however, a German critic, Friedrich August Wolf, maintained that writing was unknown in Homer's time; that the "Iliad" and "Odyssey" were by different authors, or compilers, and that they were made up of collected lays, put together in somewhat their present form, in the 6th century B. C.

Most modern critics now believe that these poems are of more than single authorship, but the weight of critical authority favors the hypothesis that they were at first the work of a single mind; though certain books and passages have been added, and they have suffered more or less changes before and since they were finally recast in their present general shape. The "Iliad" is the story of the siege of Illium (Troy), and the attempt to rescue Helen, the wife of Menelaus, King of Sparta, whom Paris, son of Priam, King of Troy, had abducted. A priest of Apollo, failing to ransom his daughter from Agamemnon, brother of Menelaus, who leads the Greeks, Apollo sends a pestilence upon the Greeks. To appease the god the maiden is surrendered, and a beautiful captive of Achilles is taken by the king instead. Achilles, resenting this, sulks in his tent, refusing to fight, till, learning that the Greeks are suffering defeat, and that his friend Patroclus has been slain, he rouses and renews the fight, and slays Hector, son of Priam, with whose ransom and burial the poem closes.

The "Odyssey" relates the return, through many hardships and adventures, of Odysseus (Ulysses) to his home after the siege of Troy, his welcome by his faithful wife Penelope, and punishment of her presumptuous suitors. The style of these poems is simple and noble, the action rapid,

and the theme dramatic and heroic. Their main author, usually called Homer, was, by all the ablest critical opinion of generations, one of the great master poets of the world.

Home Rule, the control of its own affairs by a separate political state; in British politics, a measure which obtains in most of the colonies and has been more especially advocated in regard to Ireland. The leading object of the Irish Home Rule party is the establishment of a native Parliament in Ireland to conduct all local and internal legislation, leaving the general political government of the empire to an imperial Parliament. The movement really began immediately after the union of Ireland with Great Britain over one hundred years ago, but its present form had its germ in the activities of the men who succeeded O'Connell. It took further shape in the Home Government Association at Dublin, in 1870, under the presidency of Mr. Isaac Butt. At the general election of 1874 the party succeeded in sending 60 Home Rule members to Parliament for Irish constituencies. The elections of 1885 and 1886 still further strengthened the party, 86 members following Mr. Parnell (*q. v.*).

The original scheme has been materially modified since Butt's time, and to-day leading Irish Nationalists declare openly for absolute independence, which many believe to be the ultimate aim of the whole party. The conversion of Mr. Gladstone and many members of the Liberal party to Home Rule principles after the Phœnix park murders in 1882 added immense strength to the movement. In 1886 Mr. Gladstone brought forward a measure for giving Ireland a Parliament of her own, accompanied by a Land Purchase bill. This was rejected, and in 1893 a Home Rule bill was passed by the Commons but defeated by the Lords. In 1898, however, an act passed both houses of Parliament providing for a system of free local self-government in Ireland. It follows the main lines of the legislation adopted for England and Scotland, accompanied only by such variations as are necessary owing to the special circumstances of Ireland.

The new act, as in England and Scotland, casts the duties of local government upon councils popularly elected for three years, but it does not provide for the establishment of parish councils, because never in that country has the parish been made the area of local administration. The local administration has taken over the business formerly managed by grand juries and presentment sessions, especially schools, poor-rates, roads, asylums, hospitals, public health and the appointment of coroners, and it is now in the hands of four bodies—(*a*) county council, (*b*) urban district councils, (*c*) rural district councils, and (*d*) boards of guardians; but these may be narrowed down to three in the majority of cases, because members of the rural district councils also represent the area for which they are elected as guardians, and where the union is within an administrative county the union is coincident with the rural district, so that the boards of guardians are really, as in England, the district councils acting under another name.

The majority of these local parliaments are Nationalist in constitution. This further step in the restoration of ancient Ireland amounts almost in effect to the reëstablishment of tribal government. This measure practically closed the Irish legislation of the nineteenth century, always to be remembered as that in which the regeneration of Ireland was begun. The dawn of the twentieth century saw the reunion of the Irish parliamentary party after a long period of division, with John Redmond as chairman. The Land Act of 1903 (see IRELAND) has caused a steady material regeneration. The principle of popular ownership of the land as opposed to the feudal system which heretofore obtained is irrevocably established, and the happiness and prosperity of the Irish people of all classes and callings is in great measure assured. Meanwhile the agitation for Home Rule has not ceased. In season and out of season John Redmond and the Nationalist party have kept the issue before Irishmen at home and abroad, and before the British Parliament. At last in 1907 the Rt. Hon. Augustine Birrell, chief secretary for Ireland, brought a halting and imperfect measure of Home Rule before the British House of Commons. It was received with respect by the Irish Nationalist party, who, before entering upon its discussion in the House, called a national convention in Dublin to consider its provisions. This was enormously attended by Irishmen of all classes and of all creeds, who unanimously declared against it as incomplete and insufficient, and the bill was at once dropped by the government. Ireland is therefore still without the Home Rule for which she has fought so long, but it is a tradition of British politics that any bill which once passes the lower House is bound to win in the end, and still strengthening their demand, the Nationalist party is continuing the agitation for Home Rule.

JAMES J. ROCHE.
Revised by CHARLES WELSH.

Homestead, a city in Allegheny co., Pa., on the Pennsylvania, and the Pennsylvania and Lake Erie railroads; 10 miles S. E. of Pittsburg. It is the trade center of the surrounding country; is the seat of the Carnegie steel works; and has several glass works and machine shops. There are daily and weekly newspapers, electric lights, public schools, high school, electric street railways, 2 National banks, and an assessed

Homestead and Land Laws

property valuation of $5,000,000. On July 6, 1892, labor troubles culminated in a serious riot, provoked by the introduction of Pinkerton detectives in the mills. The riot was subdued with much difficulty, and considerable loss of life by the State militia. Pop. (1900) 12,554; (1910) 18,713.

Homestead and Land Laws, laws enacted by Congress or by State Legislatures with a view to providing and securing persons or families the possession of a home and land. Under the United States laws any citizen or person who declares intentions to become a citizen, male or female, 21 years old, or head of a family, may become the possessor of a homestead of 80 or 160 acres, by occupation and cultivation, to be taken from unreserved public lands, surveyed or unsurveyed. Fee of $5 or $10 is required to be paid of filing affidavit of settlement, citizenship, age or family status. Total fee is from $26 to $34, according to the land district. Five years' residence and cultivation are required, but only three are demanded where 5 or 10 acres of forest trees have been cultivated. Ex-Union veterans or their heirs obtain patent one year after residence. Benefits are limited to one claim, except that veterans who have made one land settlement may also take a homestead claim. Under timber-culture provisions homestead locators may secure another 160 acres, including timber area, by cultivating 40 acres of trees. A homestead is free from debt liability before patent issues. Locator may, on proof of settlement six months after occupancy, buy said land at preëmption price.

Homestead discussion began in 1852 by the Free-Soil party demanding reservation for settlers. It was presented first in Congress by Galusha Grow, 1854. A bill was first offered in 1859, and passed the House. an act passed in 1860, granting homestead on payment of 25 cents an acre, was vetoed by President Buchanan. The present law was signed by President Lincoln, May 20, 1862. Homestead law initiated the National land policy. It marks the third step in definite change from purchase to settlement. Preëmption policy, granting preference to occupancy over speculating purchases, was the second step. First was sale or grants en bloc. It began in 1801 when an act was passed granting preëmption to Miami Valley settlers on Ohio-Symmes tract. Sixteen acts were passed before that of 1832, which fixed the price at $1.25 and $2.50 and divisions at 40, 80, 120, and 160 acres. Under Preëmption Laws, a locator having civic rights and also able to testify that he or she does not possess 320 acres of land in the United States, or has not abandoned any to settle on public lands, can hold for cultivation and residence up to 160 acres. After a limited period a locator may on satisfactorily proving settlement, purchase and obtain patent at minimum or maximum rate, the latter, $2.50, being paid for government land within railway grant. No restriction is placed on preëmptor's acquirement of private lands. Under timber-culture acts entry additional to preëmption or homestead may be made of legal subdivision, one fourth of which must be devoted for eight years to timber culture. On proof, a patent will issue for tracts; the total fee is $18.

Timber acts are in the nature of a land bounty for forest culture in sub-humid areas. Desert land acts are designed to encourage reclamation by irrigation of arid lands. Entry is of 640 acres permitted on "dry lands" within California, Nevada, Oregon, Arizona, New Mexico, North and South Dakota, Wyoming, Utah, Idaho, Montana and Washington. Three years are allowed to bring water thereon. On proof of this the same may be purchased at 25 cents an acre. Under present laws mineral lands are held for industrial development, miners' customs being recognized by Congress and upheld by the federal judiciary. Locators form district, lode, or placer, adopt regulations, and elect recorder. Quartz or lode claims permitted of 1,500 lineal by 600 lateral feet, 300 on each side of lode. Boundaries must be marked plainly, entry recorded, and work to the value of $100 or more be performed each 12 months in order to hold claim. Qualifications as to persons or associations are the same as in other land entries. No alien is permitted to hold, occupy, work, or possess public lands. Placer claims of 20 acres to the individual, or not over 160 to associations, are similarly permitted. Patents issue on proving up and payment of fees.

The mineral land policy of the United States fluctuated till the act of 1866 was passed. Lands were sold or leased at different periods, and the procedure was wasteful both to miners and people. Mill sites and right of way for ditches are provided for. Coal lands are preëmptible on civic and occupancy requirements by payment of from $10 to $20 per acre. First priced land is not within 15 miles of a railway; the other is within such distance. The individual limit is 160 acres; association 320 acres. An association on proof of $5,000 expenditure may enter one section. Only one entry is permitted. Saline lands being exempt from settlement, are offered for sale at $1.25 an acre, and then become subject to private entry. Public land for town site purposes is arranged for (1) by Interior Department setting aside suitable area and selling lots of definite size; (2) by town associations, filing plats of 640 acres or less therein. Town associations failing to file plats, lots may be sold publicly after 12 months at increase of 50 per cent. on minimum price. The actual occupant of a town

lot may prove up and preëmpt by time of sale, paying minimum price for same. Stone and timber lands designated as unfit for cultivation, within California, Oregon, Nevada and Washington, may be purchased by persons having required civic qualifications as follows: Affidavit and proof of non-mineral character and non-speculative purpose required, and they must be sworn to as for personal use and benefit. Notice of application to be published for 60 days in land-office and nearest newspaper. Penalties are provided for perjury or for trespass on timber lands.

The domain is also subject to various land-grant and bounty laws. These include State grants for internal improvements, institutions, common schools, seminaries, and agricultural colleges; land bounties, naval and military; canal, wagon, and railway grants; military and Indian reservations. Under graduation act, land unentered privately can be sold at public sale at minimum figures. The public domain area was acquired by cessions from original States, 259,171,787 acres; by purchase from Spain, France, Mexico, Texas and Russia 1,580,900,800 acres; total 1,840,072,587 acres.

Public lands are surveyed into "hundreds," 10 miles square: then into "sections" of 1 mile square, again subdivided into quarters, and down to eighths. This is known as the rectangular system. A general land-office, forming a bureau of the Interior Department, is in charge of land administration. Each State and Territory has a surveyor-general, and each congressional district a land-office. In the Territories these are provided as required. A large portion of the domain acquired from Mexico still remains subject to private grants. The land laws of Hawaii were drawn up with the design of protecting small holders. GRAHAM D. GILMAN.

Homicide, the killing of any human being. Homicide is of three kinds — justifiable, excusable, and felonious. The first has no stain of guilt; the second very little; but the third is the highest crime that man is capable of committing against a fellow-creature. Justifiable homicide is of various kinds, including such as arise from unavoidable necessity or accident, without any imputation of blame or negligence in the person killing. Homicide in the course of justice, in the execution of any criminal or civil process, is of this kind. The necessity must, however, be real and apparent in all cases of this sort. Homicide is justifiable in the prevention of any atrocious crime, as an attempt to murder, or to break into a house during the night. Justifiable homicide does not apply to crimes which are unaccompanied by violence, such as the picking of pockets, etc. The general principle of the law is, that when a crime in itself capital is endeavored to be committed by force, it is lawful to repel that force by the death of the party attempting it. Excusable homicide is committed either by misadventure or in self-defense. Homicide by misadventure is where a man doing a lawful act, without any intention of hurt, and using proper precaution to prevent danger, unfortunately kills another; as when a man is at work with a hatchet, the head flies off and kills a bystander; for the act is lawful, and the effect is merely accidental. As prize-fighting and sword-playing are unlawful, if either of the parties engaged be killed, such killing is felony or manslaughter. Homicide in self-defense, from a sudden affray or quarrel, is rather excusable than justifiable in the English law. Felonious homicide is an act of a very different character from the two former, being the killing of a human creature, of any age or sex, without justification or excuse. It is divided into three classes — murder, manslaughter, and self-destruction.

Homildon Hill (hom'il-don), a battlefield in England. In 1402 Earl Douglas at the head of 10,000 Scots had ravaged England as far as Newcastle, and was returning laden with booty, when on Sept. 14 he was intercepted by an English army under Hotspur and the exiled Earl of March and Dunbar, and posted himself upon Homildon (Humbleton) Hill. Hotspur was eager for a headlong charge, but, by Marsh's advice, the bowmen were set to play upon the Scots, who too late descending to come to close quarters, sustained an irretrievable defeat.

Homiletics, the art of preaching; that branch of practical theology which teaches the principles of adapting the discourses of the pulpit to the spiritual benefit of the hearers, and the best methods which ministers of the Gospel should pursue for instructing their hearers by their doctrines and example.

Homily, a sermon addressed to a congregation of people; a plain, familiar discourse on some religious topic. The "Book of Homilies," in the English Church, is the name given to a collection of sermons, setting forth the principal doctrines of Christianity, and pointing out the principles of Protestantism, of which the first part was published by Archbishop Cranmer in the reign of Edward VI., and the second by order of Convocation in that of Elizabeth.

Homœomeria (hō-mē-ō-mē'rē-ä), the name given to the physical theory of Anaxagoras of Clazomenæ, who flourished in the 5th century B. C. According to this hypothesis, every material substance is made up of infinitely small parts similar to itself. This theory bears some resemblance to that of the monads of Leibnitz in modern times.

Homœopathy (hō-mē-op'ä-thē), the system of medicine which aims at curing dis-

cases by administering medicines which produce symptoms similar to those which they are designed to remove. The Latin dictum on the subject is "like cures like." Its founder was Samuel Hahnemann (1755–1843); born in Meissen in Upper Saxony. In 1790, while investigating the operation of Peruvian bark in intermittent fevers, he found that a dose of the bark which he took produced in himself phenomena like those of the fever it was designed to combat. Pursuing his experiments, he believed he had discovered a general law that like was cured by like, and in 1810 published his "Organon of the Healing Art," in which he explained his system, calling it for the first time homœopathy. Thus to rub the affected part with snow is beneficial in frostbite, so are heated spirits of wine or oil of turpentine in burns. He appealed also to the effects of vaccination in preventing or mitigating smallpox. This, however, is not curing like by like, though there is a certain analogy between the two cases. Hahnemann and his followers have attempted experimentally to ascertain what therapeutic agent to prescribe in each case. Experience has shown them that the doses should be exceedingly minute. The great majority of medical men reject the system, though it has many advocates in the United States and abroad. Homœopathy is opposed to heteropathy or allopathy.

Homogeneous Light, in optics, light purer than an ordinary luminous body can furnish. To obtain a pure yellow, common salt should be placed in the flame of a Bunsen's burner. To produce a pure red, ordinary light must be transmitted through glass colored with suboxide of copper. For a pure blue, ordinary light should be transmitted through a glass trough with parallel sides. Called also monochromatic light.

Homoiousian (hō-moi-ō′sē-an), and **Homoousian** (hō-mō-ō′sē-an), the former of these terms was applied to the Arians, and the latter to the Orthodox party, at the council of Nice, A. D. 325. The Arian war-cry at the council of Seleucia, Sept. 27, 359, was Homoiousian. See HOMOOUSIAN.

Homologation (hō-mol-ō-gā′shun), a technical expression signifying an act by which a person approves of a deed, the effect of which approbatory act is to render that deed, though in itself defective, binding upon the person by whom it is homologated.

Homologous, in geometry, corresponding in relative position and proportion. In physiology, corresponding in type of structure; thus, the human arm, the foreleg of a horse, the wing of a bird, and the swimming-paddle of a dolphin or whale, being all composed essentially of the same structural elements, are said to be homologous, though they are adapted for quite different functions.

Homoousian, a word meaning consubstantial, of the same substance or essence. Used specially, if not even exclusively, of the second Person of the Trinity whom it asserts to be of the same substance as the first. That this is the Scriptural view was authoritatively decided by the Council of Nice in A. D. 325. Opposed to homoiousian.

The party constituting the majority of the Council of Nice, who held homoousian doctrine, and established it by a majority of votes. After manifold troubles and vicissitudes, it became the general faith of Christendom, and is still held and embodied in the symbolical books of the Greek, Roman, German, Swiss, English, Scottish, and other churches. The Homoousians are sometimes called from their leader Athanasians.

Homotaxis, the arrangement of strata in different localities, apparently in the same relative position in the geological series, without its being known whether or not they are contemporaneous. The existence of the same fossils, or many of them, in strata widely separated in geographical position, or at least not occurring together, so as to have their relative age tested by proved continuity, or by visible superposition. Formerly the occurrence of such beds, even in remotely separated regions, say Great Britain and India, was held to prove the absolute contemporaneity of the periods at which the respective strata were deposited; now it is held that the presumption is against their being quite contemporaneous; for if the organisms came into being in one of the two regions, they would naturally take some time to spread to the other.

Homuncionite (hō-mun′sē-ōn-īt), one of the followers of Photinus, Bishop of Sirmium, who, in A. D. 343, maintained that only the Father was a divine personality, that the Word of God was His understanding, and the Holy Spirit one of His attributes. Jesus he believed to have been a mere man, born by natural generation, and adopted, on account of his preëminent virtue and piety, by God as a son. After being censured by the councils of Antioch, Milan, and two councils at Sirmium, the last under Arian management, he was finally deposed from his office, dying in A. D. 372.

Honan, or **Ho-Nan** (hō-nan′), a central province of China; area, 67,940 square miles; pop., est. (1904) 35,316,800. Its capital, Kaifung-fu, is on the Yellow river, from which it has often suffered, the river bed being here elevated above the adjacent country. It has been overflowed 19 times. In the reign of Fuhi (2852 B. C.) it was the capital of China.

Hondo (hon'dō), the name given by the Japanese to the chief island in their empire. In many geographical works Nippon or Niphon is the distinctive appellation of this island, but by the Japanese themselves that name is applied to the whole country. The area of the island is 87,425 square miles; pop. (1903) 35,459,993. See JAPAN.

Honduras, a republic of Central America; bounded by Nicaragua, Guatemala, the Caribbean Sea and the Pacific Ocean; area, 46,250 square miles; pop. (1905) 500,136; capital, Tegucigalpa.

Topography.— The country is generally mountainous, and is traversed by the Cordilleras, connecting the Andes on the S. with the Sierra Madre on the N. The rivers are numerous though small, the principal ones being the Ulna, Aguan, Choluteca, and Chamelican. The republic has nearly 500 miles of sea coast with numerous fine harbors.

Climate and Productions.— The climate is mild in the higher regions and semi-tropical in the lowlands. Agriculture is the principal occupation of the people. The chief products are bananas, tobacco, sugar, maize, coffee, indigo, rice, and wheat. The mineral resources are great; gold, platinum, silver, copper, lead, zinc, iron, antimony, nickel and cobalt being found in nearly every department. The gold production is estimated in value from $150,000 to $250,000 per annum.

Commerce.— The foreign commerce is carried on principally with the United States and Great Britain. The imports in 1898 amounted to $583,230, and the exports $617,980. The principal articles of export were, bananas, $212,500; cattle, $58,500; coffee, $40,000; cocoa, $36,000; and wood, $22,000. The metallic exports were gold, $14,470; silver $511,615; and other metals, $14,575.

Communications.—The republic has several fine macadamized roads, connecting the capital with surrounding towns. There is a railroad, 60 miles in length, connecting Puerto Cortez and San Pedro Sula with La Pimienta. In 1898 there were 244 post-offices, transmitting 937,700 letters; 155 telegraph offices, with 2,730 miles of line, transmitting 458,593 messages; and telephone service in the larger towns.

Finance.— In 1899 the external debt with interest amounted to $89,174,470; and the internal debt, $2,759,420. The revenue in 1897, derived principally from customs, and duties on tobacco and spirits amounted to $1,194,250, and the expenditure, $1,200,140.

Government.— Under the charter of 1894 the government is that of a republic. The legislative power is vested in a Congress of Deputies, one for every 10,000 inhabitants. The executive authority rests with the president elected by popular vote every four years, assisted by a Council of Ministers, to whom are intrusted the Departments of Interior, Public Works, War, Finance, Public Instruction, and Justice.

Religion and Education.— The constitution grants freedom to all creeds, but the Roman Catholic is the strongest. Instruction is free and compulsory, between the ages of 7 and 15 years, and entirely secular. There were in 1900, 683 primary schools, with 23,767 scholars; and 23 secondary schools, with 1,588 scholars; besides a university at Tegucigalpa, with faculties of medicine, law, science, and political sciences; and one at Cornayagua, with a faculty of jurisprudence. The annual expenditure for primary instruction amounts to $69,500.

History.— Honduras was discovered by Columbus in 1502, conquered by Cortez in 1523, joined the Republic of Central America in 1821 and became an independent State in 1839. There have been several small civil wars and conflicts with adjoining States. In 1894 the present constitution was adopted and in 1897 Honduras became a part of the Greater Republic of Central America which soon dissolved.

Honduras, Bay of, a wide inlet of the Caribbean Sea, having on the S. Guatemala and Honduras, and on the W. British Honduras and Yucatan. Along its shores are the islands of Bonaca, Ruatan, Utila, Turneff, and numerous islets and reefs called cays.

Honduras, British. See BELIZE.

Hone, a flat slab, usually of some description of slaty stone, used for giving a keen edge to a cutting-tool after sharpening on the grindstone. Various kinds, differing greatly in texture and hardness, are employed. Norway ragstone, water-of-Ayr, blue-stone, German-hone, and many other varieties, have a more or less extended reputation for their adaption to special requirements, being used either dry or moistened with water or with oil. The Turkey oil-stone, which comes from Asia Minor, is generally known, and is employed for imparting an edge to chisels, plane-bits, and all the finer varieties of cutting-tools. It is usually cemented into a slab of wood and provided with a wooden cover.

Hone, William, an English antiquary; born in 1780. He began life in a law office and became imbued with freethinking opinions. In 1817 he was prosecuted by the English government for the publication of alleged irreverent parodies and lampoons, when he defended himself with great acuteness, and was acquitted. He subsequently had a large sum subscribed for him as a champion of the freedom of the press. He

gradually abandoned freethought and the writing of satires for religion and antiquarianism. His chief publications are the "Every-day Book" (1826), "Table-book" (1827–1828), and "Year Book" (1839), perfect mines of antiquarian lore. He died in 1842.

Honesty (*Lunaria*), a genus of plants of the natural order *Cruciferæ*, of which two species, natives of the S. of Europe, *L. annua* or *biennis* and *L. rediviva*, have long been cultivated in flower-gardens, on account partly of the beauty of their flowers, and partly of the curious appearance of their large flat seed-pouches (silicules), or rather their large oval membranous dissepiments, which are very persistent, resemble polished films of mother-of-pearl, and are frequently used as mantelpiece and table ornaments. The origin of the English name is doubtful. Some of the older English poets mention the plant as *Lunarie* — "in sorceries excelling"; for it was reckoned among herbs potent for magic.

Honey, a product primarily of a vegetable character, in many plants existing at the base of the corolla, sometimes in a more or less elongated tube, closed at the lower end, called by Linnæus, on account of its contents, a nectary. Neuter bees collect it to store against winter, and swallowing it by means of their proboscis, transfer it to a distended portion of the œsophagus, called the honey-bag. There certain chemical changes take place upon it, so that when placed, as it ultimately is, in the honeycomb, it is not, as at first, exclusively a vegetable product. When elaborated by young bees it is whiter than in other cases, and is called virgin honey. When obtained by the bees from some plants, it is poisonous. That which killed some of Xenophon's soldiers was taken from a heath, *Azalea pontica.* It is sometimes called Euxine honey. Narbonne honey owes its fine flavor to the rosemary (*Rosmarinus officinalis*). Honey is used as an article of food, but is apt to cloy on the appetite, and be too laxative to the bowels. In pharmacy it is used chiefly like sugar as a vehicle for nauseous medicines, and as a remedy for coughs and colds.

Honey Ant, an ant (*Myrmecocyctus mexicanus*) inhabiting Mexico, and living in communities in subterranean galleries. In summer a certain number of these insects secrete a kind of honey in their abdomens which become so distended as to appear like small pellucid grapes. Later in the season when food is scarce these ants are devoured by the others, and they are also dug up and eaten by the inhabitants of the country.

Honey Buzzard, or **Bee-Kite** (*Pernis apivorus*), one of the *Falconidæ* allied to both kites and buzzards, but with many peculiarities, such as the thick feathering of the sides of the head down to the base of the bill. It winters in Africa, and breeds in the wooded districts of North Europe, ranging, however, as far E. as China and Japan. The honey buzzard owes its name to its habit of plundering the nests of bees and wasps for the sake of the larvæ, and apparently also the honey. It also devours grubs of many kinds and various small animals. The nest, often founded on that of some other kite, is situated on some leafy tree, and may be further concealed by a covering of leaves, which are replaced as they wither. The eggs, usually two, are laid in June, which is late for a bird of prey. The genus includes a few other species.

Honeycomb, the hexagonal cell formed by the hive bee for the reception of honey and for the eggs of the queen bee, and a habitation for the larva of the insect till reaching maturity. The teleologist points out that under the direction of the Divine Mathematician the bee constructs a cell with the maximum of strength and the minimum of material.

Honeycomb Moth, in entomology, *Galleria cerella,* a small moth which does much damage in beehives, piercing the combs and building as it proceeds a single tube, covered with the excrement of the insect, and formed of the wax on which it feeds. Why the bees tolerate such a foe is a mystery.

Honey Dew, a viscid saccharine exudation which is often found in warm dry weather on the leaves and stems of plants, occurring on both trees and herbaceous plants. It is often, but not always, associated with the presence of aphides, cocci, and other insects which feed on the juices of plants, and its flow is ascribed to their punctures; but the rupture of the tissues from any other cause, such as the state of the weather, seems also to produce it, and warm dry weather seems to be necessary for the production in the sap of that superabundance of sugar which is thus thrown off. Orange and lemon plantations sometimes suffer great injury from the abundance of honey dew; and it has proved a cause of very great loss in the coffee plantations of Ceylon.

Honey Eater, or **Honey Sucker,** the name of a large family of birds (*Meliphagidæ*), tribe *Tenuirostres*, order *Insessores*, characterized by their long, sharp, slender, curved bills, and their long cleft extensile tongue terminating in a pencil of bristle-like filaments. They are entirely confined to Australia and the islands included in the Australian region, where they are very abundant, living on honey and insects, which they are particularly well adapted for gathering from the flowers of such trees as the eucalyptus and banksia. Twenty-three genera and 190 species are enumerated.

Honey Guide, a species of cuckoo, *Cuculus indicator,* which inhabits various parts of Africa, and is celebrated for its curious habit of guiding the natives to the nests of wild bees, enticing them to the spot by flitting before them and reiterating a peculiar cry.

Honey Locust, Sweet Locust, or **Black Locust** (*Gleditschia triacanthos*), a forest tree belonging to the United States, natural order *Leguminosæ.* The leaves are pinnated, divided into numerous small leaflets, and the foliage has a light and elegant appearance; the flowers are greenish, and are succeeded by long, often twisted pods, containing large brown seeds, enveloped in a sweet pulp. This tree is especially remarkable for its formidable thorns, on which account it has been recommended for hedges. The *G. monosperma,* a tree resembling the last in general appearance, grows in swamps in Illinois and the Southwest. The wood is inferior in quality.

Honey Springs, a locality in Kansas near Elk Creek, 25 miles S. of Fort Blunt. A sharp action of two hours duration was fought here, July 17, 1863, between 6,000 Confederate troops under General Cooper, and 3,000 Union men commanded by General Blunt. The former suffered a defeat, leaving 150 men dead on the field, and 77 prisoners, besides suffering a loss of 400 men wounded. National loss 77 men, of whom 17 were killed.

Honey Stone, or **Mellite,** a mineral of remarkable characters and composition, found in connection with brown coal (generally accompanied by sulphur) in several places in Germany. It occurs in square octahedrons, looks like a honey-yellow resin, and may be cut with a knife. It is a mellate of alumina, consisting of mellitic acid, alumina, and water.

Honeysuckle, in botany, the genus *Lonicera.* The common honeysuckle is *L. periclymenum;* the stem is 10 or 20 feet high, climbing; the corolla one to one and a half inches long, dirty-red outside, and yellow within. It is found in Europe and North Africa. It flowers from June to September. A cultivated variety is common in gardens. It is called also woodbine and by Milton twisted eglantine. Loudon and others place the climbing species under the genus *Caprifolium,* and the upright ones under *Lonicera,* calling the common honeysuckle *C. periclymenum.* The leaves of the honeysuckle are to a certain extent fetid, emetic, and drastically purgative, its flowers fragrant and sudorific.

Hong-Kong, or **Hiang Kiang** (The Fragrant or Flowing Streams), a small island off the S. E. coast of China, in the province of Quang-Tong, now belonging to the British. It is situated at the mouth of the estuary that leads to Canton, from which it is distant S. E. 75 miles; and from Macao 40 miles E. It is about 10 miles in length and 7½ miles in breadth, and is separated from the mainland by a strait, which at Lymoon or Ly-ee-moon Pass is only about a quarter of a mile wide. To the colony belongs also a peninsular extension of the mainland opposite, known as Kowloon. The coast of Hong-Kong is indented by numerous bays, of which the most considerable are on the S. E. side of the island which they form into two peninsulas. The general appearance of the island is somewhat picturesque and curious, but on the whole rugged and bare, being composed mostly of granite rocks that rise from the sea to heights of 1,000 and 2,000 feet, and so abruptly as to leave hardly any level space. There are no trees of any size on the island, except those that have been planted in recent times, and few valleys of any extent. Some rank vegetation here and there, with a little herbage and brushwood growing in the intervals between the masses of granite or on the margins of the streams, form almost the only vegetable productions. Good water, however, is abundant, and some of the cascades are sufficiently picturesque. The climate, at one time considered very unhealthy, is now believed to be quite as well suited to European constitutions as that of any of the British E. tropical possessions. On the N. side of the island, and situated on a magnificent bay capable of accommodating any number of vessels, affording excellent anchorage and deep water close inshore, is the thriving town of Victoria, where the great bulk of the population is centered. This bay presents a lively and busy scene, being crowded with shipping of every nation, and with dense masses of junks, boats, and other Chinese craft. The town stretches for about four miles along the shore and also ascends the hillside and the faces of the ravines above. It is generally well built, with wide streets and handsome terraces, and there is a massive sea wall along the sea front. The many newly erected houses of sightly exterior, stuccoed, and with green verandas; the increase of vegetation upon the public roads and around the private houses; the construction of the government gardens and of waterworks and gasworks, and an elegant drinking fountain, give an improved appearance to the city, assist its sanitary condition, and add to the comfort of the inhabitants. Among buildings of more or less note in Victoria are a cathedral, a bishop's palace, a government house, a court house, an exchange, a city hall, hospitals, barracks, schools (government and other); while handsome residences of the merchants are scattered about the town and its elevated suburbs, and are also numerous in Kowloon. The schools include Victoria College, a cen-

tral government school for boys, a number of other government schools free and undenominational, many free schools connected with the various missionary societies, and a medical college for Chinese. English, Portuguese, and three dialects of Chinese are taught in the schools. The roads in the islands are mostly for foot passengers only. In Victoria there are cable tramways and omnibuses, but the common mode of conveyance is by chairs carried by porters. The position of the colony of Hong-Kong is peculiar; it is merely a great commercial entrepôt, itself producing little either in the way of natural products or manufactured goods; but so admirable is its situation that it has become a center of distribution and collection for China and other neighboring regions, and is a place frequented by great ocean mail steamers from all parts of the world, such as those of the P. and O. Company, the Messageries Maritimes, the North German Lloyd and the Austrian Lloyd, the Canadian Pacific line to Vancouver, lines to the Australian Colonies, San Francisco, Portland, etc. There is daily communication with Canton and Macao. The port is well provided with docks and repairing slips for vessels. The prosperity of the colony is largely owing to the great numbers of Chinese who resort to this port for the purposes of trade, with no intention of becoming permanently British subjects. Hong-Kong is a free port, and there are no returns of its total trade, the chief articles of which consist of cottons and opium as imports, tea and silk as exports. The foreign commerce is chiefly carried on with Singapore, Japan, Great Britain, Australia, the United States, and Germany.

Hong-Kong was ceded to Great Britain by the treaty of Canton in 1841, and again by the treaty of Nanking in 1842. The Kowloon portion of the colony became British in 1861. In 1898 Great Britain secured a lease for 99 years of a further portion of the mainland, with the neighboring waters and the island of Lan Tao, the leased area amounting to about 400 square miles. The government of the colony is vested in a governor, an executive council of six officials and two others, and a legislative council of seven officials and five others. An effective police has been established, consisting partly of Europeans, the rest being Sikhs and Chinese. There is an imperial garrison of about 3,500 men, and a small volunteer artillery force. Hong-Kong is the headquarters of the British squadron in Chinese waters, there being a naval dockyard and victualing yard, and a coaling station; the town and harbor are protected by strong batteries. The revenue (amounting to about £600,000) is raised chiefly by municipal rates, and by opium and other licenses. The currency consists of bank notes, silver dollars, and other coins, accounts being kept in dollars and cents. The population on the first occupation of the place by the British was only 5,000. In 1909 it numbered 334,372.

Honiton (hon'ton), a town of Devonshire, England, near the left bank of the Otter. The famous Honiton pillow-lace, a manufacture introduced here by Flemish refugees in the middle of the 16th century, is still a specialty of the district. This variety of lace is made by placing a perforated pattern upon a pillow, and then so twisting and interweaving the thread by means of bobbins, pins, and spindles, as to produce the required pattern.

Honolulu, a city and capital of Hawaii, on the island of Oahu on Oahu Bay. It is the most important city in the Pacific islands and is an important entrepôt for vessels, between the United States and Asiatic countries. Its harbor, one of the finest in the world, and accommodating the largest vessels, is formed by a deep basin in the coral reef which surrounds the island. The city is situated amid beautiful tropical surroundings and has an equable and healthful climate. Among the chief points of interest are the Palace, the Government Buildings, Roman Catholic cathedral, post-office, and the Bishop Museum, containing the celebrated feather cloaks of Kamehameha, valued at $150,000. There are numerous churches, public schools, public library, theater, daily and weekly newspapers, telephone and telegraph, banks, electric lights and street railways, and many commercial establishments. Pop. (1890) 22,907; (1900) 39,306; (1910) 52,183.

Honor, a word of many applications. At cards one of the four highest trump-cards — viz., the king, queen, knave, or ace. In English law a seigniory of several manors, held under one baron or lord-paramount. At the English universities the first or highest class in an examination; as, He went out in "honors." A debt of honor, a debt, as money lost in gambling, which cannot be recovered by legal process, but the payment of which depends solely upon the honor and good faith of the person owing it. A point of honor, a scruple arising from delicacy of feeling, on which depends the course to be pursued in certain cases. Word of honor, a verbal promise or engagement by which one pledges his honor or good faith. Court of honor, a court or tribunal for hearing and determining questions relating to the laws of honor, and for deciding on and correcting encroachments in matters of precedence, coat-armor, etc. Originally it was a court of chivalry. Honors of war, a distinction or privilege granted to a beaten enemy, as, to march out of a town or camp armed, and with colors flying. On or upon one's honor, a declaration pledging one's honor or reputation to the

truth, accuracy, or good faith of a statement. To do the honors, to act as master or mistress at a dinner, reception, etc.

Honoratus (hon-or-ā′tus), the name of two saints in the Roman calendar. The first, Bishop of Arles and founder of the monastery of Lerius, died in 429. The second, Bishop of Marseilles, and a religious writer, was born about 420 or 425.

Honorius, Flavius (hon-ōr′ē-us), a Roman emperor; son of Theodosius the Great; born in A. D. 384. After the division of the empire, A. D. 395, Honorius received the W. half, but, on account of his youth, Stilicho was appointed his guardian. The principal events of his reign are the adoption of rigorous measures against paganism in 399; the invasion by Alaric in 400–403; another irruption of barbarians under Rhadagaisus, 405–406. Both invasions were repelled by Stilicho, who was assassinated at Ravenna in 408. Alaric marched on Rome and plundered it in 409, while Honorius shut himself up in Ravenna. Some of the finest provinces of the empire, Spain, Gaul, and Pannonia, were lost in this reign. He died in A. D. 423.

Honorius I., a Pope; succeeded Boniface V. as Bishop of Rome in 625. His name is connected with the history of the paschal controversy in Ireland and with that of the early Anglo-Saxon Church. At the height of the Monothelite controversy Honorius, at the suggestion of Sergius, patriarch of Constantinople, abstained from condemning the new doctrines, and for his luke-warmness in so doing was stigmatized as a heretic at the Council of Constantinople (680). He died in 638.

Honorius II., Pope; succeeded Calixtus II. in 1124, and, at the same time, Thibauld was chosen by another party, under the name of Celestin; but he resigned the chair to his rival. He died in 1130.

Honorius III., was made Pope after Innocent III., in 1216. He died in 1227.

Honorius IV., a Roman; ascended the papal throne in 1285. He displayed great zeal for the Church, and promoted the crusades. He died in 1288.

Honos, or **Honor,** a Roman divinity, whose worship was intimately connected with that of Virtus.

Honthorst, Gerard van (hōn′torst), a Dutch painter; born in Utrecht, Nov. 4, 1590. His best pictures are imitations of Caravaggio, whose works greatly influenced him while studying in Rome; he was particularly fond of painting interiors dimly illumined by lamps or candles. The "Liberation of St. Peter," the "Martyrdom of St. John," the "Musician," the "House in the Wood," and the portraits of Mary de' Medici, the king and queen of Bohemia, and the Duke of Buckingham may be taken as representative of his skill. He died in Utrecht, April 27, 1656.

Honvéd (hon-ved′), the name given in Hungary under the earlier kings to the national champions. In the summer of 1848 the term was revived, and applied first to the revolutionary armies, and after the organization of the Hungarian landwehr in 1868 to that body of men.

Hooch, or **Hoogh** (hōh), **Pieter de,** one of the best Dutch painters in genre; born in 1630. He was peculiarly successful in depicting scenes, illuminated by sunlight, of Dutch domestic life. Many of his finest works are in British galleries. He died about 1681.

Hood, Alexander, an English naval officer; born in 1727. After service in the Mediterranean and Channel under Saunders and Hawke, he distinguished himself in 1760, while in command of the "Minerva" by recapturing from the French the "Warwick," a 60-gun ship, formerly English, but then armed with 34 guns. During the American War of Independence he served much under Keppel, Rodney, and Howe, in the Channel and the Strait of Gibraltar. He died May 3, 1814.

Hood, Edwin Paxton, an English clergyman; born in Westminster in 1820. For many years pastor of a Congregational church in London, editor of the "Eclectic Review," and a popular lecturer, he wrote, compiled and edited nearly 50 volumes, among which are: "John Milton" (1851); "The Uses of Biography" (1852); "Biography of William Wordsworth" (1856); "Lamps, Pitchers, and Trumpets" (1867), lectures delivered to theological students; "The World of Anecdote" (1869); "The Romance of Biography" (1876); "Oliver Cromwell, his Life, Times, Battle-Fields, etc." (1884); "The Throne of Eloquence" (1885). He died in 1885.

Hood, John Bell, an American military officer; born in Owenville, Ky., June 1, 1831. He was graduated at West Point in 1853, and saw some service against the Indians. He entered the Confederate army, commanded a brigade, and was severely wounded at Gaines's Mill, at Gettysburg, and at Chickamauga, where he lost a leg and was made Lieutenant-General. He commanded a corps under Gen. J. E. Johnston in the retreat to Atlanta, and in July, 1864, succeeded him in command of the army. On Sept. 1 he was compelled to evacuate the city, and leave the road free for Sherman's march to the sea. He yet made a bold attempt to cut Sherman's communications, and, though worsted at Franklin on Nov. 30, pushed as far N. as Nashville; but here he was again defeated by Thomas on Dec. 16, and at his

own request he was relieved of command. He died in New Orleans, Aug. 30, 1879. His personal experiences were published posthumously as "Advance and Retreat" (1880).

Hood, Robin, a chivalrous outlaw of the reign of Richard I. His exploits in Sherwood Forest are the subjects of many admired ballads. All the popular legends celebrate his generosity and skill in archery. The principal incidents of his history are to be found in Stow, and a complete collection of the ancient poems, songs, and ballads relating to him was published by Ritson in 1795.

Hood, Samuel, Viscount, a British naval officer; born in Butleigh, England, Dec. 12, 1724; joined the navy when a boy. He commanded the "Vestal," with which after a severe battle he took the French frigate "Bellona"; was created a baronet in 1778 and promoted rear-admiral of the blue in 1780. In the following year he fought an indecisive battle with De Grasse near North Carolina; was a member of Parliament in 1784–1788 and was reëlected in 1790; and was raised to the peerage in 1796. He died in Bath, England, Jan. 27, 1816.

Hood, Thomas, an English poet and humorist; born in London in 1798. During a residence at Dundee, and while only 15 or 16 years of age, he contributed articles to a local paper and magazine. In 1821 he became subeditor of the "London Magazine," and in 1826 appeared his "Whims and Oddities," which was followed by "National Tales" and a volume of serious poetry. From 1829 to 1837 he conducted his "Comic Annual." At the same time his pen was employed on other subjects, and he published "The Epping Hunt," a comic poem, ridiculing cockney sportsmen; "The Dream of Eugene Aram" and "Tylney Hall," a novel. In 1837, on the termination of the "Comic Annual," he commenced a monthly periodical entitled "Hood's Own," which consisted chiefly of selections from the former work. His health now began to fail, and with a view to its recovery he paid a visit to the Continent. While there in 1839 he published his "Up the Rhine," which, based on the lines of "Humphrey Clinker," was very popular. Shortly after his return

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he undertook the editorship of the "New Monthly Magazine," and continued it till 1843. His principal contributions to it he published separately, under the title of "Whimsicalities." His last periodical, entitled "Hood's Magazine," was commenced in 1844. It was during his last illness that he contributed to "Punch" "The Song of a Shirt," "The Bridge of Sighs," and "The Lay of a Laborer." Hood is unrivalled as a punster, and he possesses a singular power of combining the humorous with the pathetic. He had the satisfaction of knowing that the pension of $500 conferred upon him on his last illness by Sir Robert Peel was to be transferred to his wife. He died in 1845.

Hood, Tom, an English author; son of the preceding; born in 1835. He studied at Oxford, and during his residence there he wrote "Pen and Pencil Pictures." In 1861 appeared his "Daughters of King Daker, and Other Poems." In 1865 he became editor of "Fun," which was very popular under his management. His talents, though similar to those of his father, were less brilliant. He died in 1874.

Hooded Seal (*Cystophora cristata*), a species of seal, the male of which possesses a movable, inflatable muscular bag, stretching from the muzzle to about five inches behind the eyes. The prevailing color is bluish black — the head and limbs being uniformly black. Its usual range extends in America S. to Newfoundland, and in Europe to Southern Norway.

Hoodmold, or **Hoodmolding,** a band or string over the head of a door, window, or other opening, in a mediæval building; so called from its enclosing, as within a hood, the inferior moldings and the opening itself. The character of the moldings differs slightly in Norman and Pointed architecture; being in the former merely a fillet accompanied by a splay, often ornamented with a billet and zigzag; and in the latter an ogee molding with a hollow on the side of the tracery. The term is also applied, in Gothic architecture, to the label or label molding, called also drip stone.

Hoofs, the horny tissues which constitute the external part of the feet of certain animals, mostly herbivorous. They may be regarded as homologues of the toe-nails of other animals. They are composed of epithelium cells agglutinated and dried, and of intercellular substance and cell contents. Chemically they consist of keratin.

Hooft, Pieter Corneliszoon (hōft), a Dutch historian; born in Amsterdam, March 16, 1581. His works give him high rank, especially his volume of collected "Poems." In prose, the "History of Henry IV."; "History of the House of Medici"; and

"History of the Low Countries," display a talent worthy of a great annalist and investigator. He died in The Hague, May 25, 1647.

Hooghly, or **Húgli** (hög-lē′), a river of Bengal proper, and commercially the most important. Taking its distinctive name near the town of Santipur, it has a S. course of 64 miles to Calcutta, and a further course of 81 miles in the same direction to the Bay of Bengal. Being a deltaic river, the Hooghly is much subject to being silted up, and is only kept open to navigation by the vigilant exertions of a special staff of river engineers. In spite of these drawbacks vessels drawing 26 feet of water are safely taken up to Calcutta by the Calcutta pilots. At its mouth the Hooghly has a width of 15 miles.

Hooghly, a city of Bengal proper, capital of a district; on the right or W. bank of the Hooghly river, 25 miles N. of Calcutta. Here is a college for English and Asiatic literature, which owes its existence mainly to the munificence of a native.

Hook, James, an English clergyman; born in London in June, 1771. Educated at Oxford, he took holy orders, rose rapidly in the Church, and in 1825 was appointed Dean of Worcester. He wrote political pamphlets, sermons, etc. Two of his novels, "Pen Owen" (1822) and "Percy Mallory" (1823) attracted much attention. He died in Worcester in 1828.

Hook, James Clarke, an English painter; born in London, Nov. 21, 1819. In 1850 he was elected an Associate of the Royal Academy, and 10 years later full Academician. In the meantime he had begun to work at subjects connected with the lives of the people, more especially pieces illustrating seafaring life. His powers in this line of study, his most characteristic and his best, are illustrated by the "Widow's Son Going to Sea," "Ship-boy's Letter," "Coast-boy Gathering Eggs," "Luff, Boy," "Carting for Farmer Pengelly," "Tickling Trout," "A Mermaid," etc. He died April 15, 1907.

Hook, Theodore Edward, an English journalist; born in 1788. After leaving Harrow he employed himself in composing the farce of "The Soldier's Return," instead of reading for Oxford. For some years Hook led a life of gaiety in London, and became notorious for practical jokes and similar escapades. In 1812 he was appointed accountant-general and treasurer of the Island of Mauritius; but, owing to his gross carelessness, a large deficiency in the military chest was discovered, and in 1818 he was sent home under arrest, but no proceedings were taken against him. From 1820 to 1841 he was editor of the "John Bull," and at intervals from 1824 to 1828 he published his "Sayings and Doings," while in 1836 he became editor of the "New Monthly Magazine." His other principal works are "Life of Sir David Baird," and a series of novels, among which are "Love and Pride," "Jack Brag," "Gilbert Gurney," "Gurney Married," "Precepts and Practice," "Fathers and Sons." He died in 1841.

Hook, Walter Farquhar, an English ecclesiastical historian; born in London in 1798; son of Dr. James Hook, afterward Dean of Worcester. He was educated at Winchester and Christ Church, Oxford, took orders in 1821, and, after holding some minor preferments, was appointed vicar of Leeds in 1837. Here, mainly by his energy and enthusiasm, no fewer than 21 new churches were built in Leeds, as well as 23 parsonages and 27 schools, while the parish church was rebuilt at a cost of $140,000. In 1859 Hook was made Dean of Chichester by Lord Derby. His leanings towards Tractarianism brought him no little unpopularity; but throughout life he maintained a high ideal of devoted churchmanship. He died Oct. 20, 1875. A memorial church at Leeds, which cost $125,000, and was designed by Sir G. G. Scott, was consecrated in 1880.

Hookah, the water tobacco-pipe of Arabs, Turks, Persians, Hindus, and other Orientals. It consists of a bowl for the tobacco, a water-bottle, and a long flexible tube ending in the mouthpiece. A wooden tube leads from the bottom of the head or bowl down into the water in the bottle, and the flexible tube is continued downward by a stiff tube into the space above the water in the bottle. Thus the smoke is cooled before it reaches the mouth of the smoker. Many of these pipes are beautifully decorated, or even encrusted with gems. The "hubble-bubble" of India (named from the sound produced) is a similar but simpler water-pipe, made of a cocoanut filled with water, and two short wooden tubes at right angles, one going into the water, the other merely passing inside the top of the shell.

Hooke, Robert, an English philosopher; born in Freshwater, Isle of Wight, July 18, 1635. In 1662 he was appointed curator of experiments to the Royal Society, and in 1677 became its secretary; in 1665 Professor of Geometry in Gresham College, London; and after the great fire of 1666 he acted as surveyor of public works. There was no important invention by any philosopher of that time which was not in part anticipated by Hooke. His theory of gravitation subsequently formed part of Newton's; he anticipated the invention of the steam engine, and the discovery of the laws of the constrained motions of planets. He died in Gresham College, March 3, 1703.

Hooker, Mount, a peak in the Rocky Mountains in Canada; 15,690 feet high; on the E. boundary of British Columbia.

Hooker, Isabella Beecher, an American philanthropist; born in Litchfield, Conn., Feb. 22, 1822; daughter of Rev. Dr. Lyman Beecher. She made a life study of woman's rights and duties, and wrote "Womanhood," etc. She died Jan. 25, 1907.

Hooker, Joseph, an American military officer; born in Hadley, Mass., Nov. 13, 1814; was graduated at the United States Military Academy, in 1837, and served in the Florida and Mexican Wars. In 1853 he resigned from the army, but on the outbreak of the Civil War he reëntered it. He fought under McClellan and in Northern Virginia and Maryland, receiving a wound at the battle of Antietam. On account of his bravery his soldiers nicknamed him "Fighting Joe Hooker." His concern for his soldiers, especially his care that they be well fed, made him popular with the rank and file. In 1863, he was made commander of the Army of the Potomac, and in May he fought the bloody battle of Chancellorsville, in which nearly 30,000 were killed or wounded. Owing to a difference between himself and General Halleck, Hooker resigned his command (1863), but he still served as Major-General, and fought under Grant at Chattanooga, and under Sherman at Atlanta. In 1868 he retired from the army. He died in Garden City, N. Y., Oct. 31, 1879.

Hooker, Sir Joseph Dalton, an English botanist; born in Halesworth, Suffolk, June 30, 1817. He was assistant surgeon and naturalist of the expedition of Sir James Clark Ross; visited India in 1847; and in 1871 with John Ball ascended the Great Atlas in Morocco. From 1855 to 1885 he was on the directorate of Kew Gardens. Among his works are: "Botany of the Antarctic Voyage" (1847–1860); "Himalayan Journals" (1854); "Student's Flora of the British Islands" (1870); "Botany" (Science Primers), in 1876; "Journal of a Tour in Morocco and the Great Atlas" (1878), with John Ball.

Hooker, Richard, an English divine; born in 1553. He became a Fellow of Christ Church in 1577. In 1579 he was appointed deputy Professor of Hebrew; took orders in 1581, and was made preacher at Paul's Cross. In 1584 he became rector of Drayton Beauchamp, and in 1585 Master of the Temple. In 1595 he received the living of Bishopsbourne, in Kent, where he ended his days. His "Ecclesiastical Polity," published at various dates, and written in defense of the Church of England, is no less remarkable for learning and extent of research than for the richness and purity of its style, which entitles its author to be regarded as one of the classics of the Elizabethan age. He died in 1600.

Hooker, Thomas, an English clergyman; born in Markfield, Leicestershire, in 1586. He came to America in 1633. In 1636 removed from Newtown (Cambridge, Mass.) to Hartford, and founded that colony, becoming minister of the First Church there. He won eminence as a theological writer and a preacher, and has a permanent historical importance for his instrumentality in drawing up the first written constitution in America — that of the Hartford Colony. His chief work is "A Survey of the Summe of Church Discipline," in collaboration with John Cotton. He died in Hartford, Conn., July 7, 1647.

Hooker, Sir William Jackson, an English botanist; born in Norwich, in 1785. A zealous botanist, he traveled much in his favorite pursuit. He was Regius Professor of Botany in Glasgow University in 1820–1841, when he became director of the Kew Gardens. He was knighted in 1836 on account of his high scientific attainments. His best-known botanical works are: "Journal of a Tour in Iceland" (1809); "Muscologia Britannica" (1818), containing the mosses of Great Britain and Ireland; "The British Flora" (1830), which has gone through several editions; "British Ferns" (1862); "Garden Ferns" (1862). He died in Kew, Aug. 12, 1865.

Hook and Eye, dress fasteners. They were formerly made by hand by bending the wire of which they are formed into the proper shape with pliers. But for many years they have been made by machines, which are complex in their details. By one kind of machine the wire is first drawn off a reel, next cut to the required length, then by a sinker forced into a slot by which it is bent, and at the same time the two ends are formed by cams into the lateral loops. This is the process for an eye, but a hook requires an additional bend, and this is produced by another slot and sinker. Makers of these articles do not, however, all use the same kind of machines.

Hoole, John, an English dramatist and translator; born in 1727. In 1763 he published a translation of Tasso's "Jerusalem Delivered," and of six dramas of Metastasio in 1767. His tragedies of "Cyrus," "Timanthes," and "Cleone" were unsuccessful. In 1773–1783 he published separate volumes of his translation of "Orlando Furioso." In 1792 he translated Tasso's "Rinaldo," and ended his literary labors with a more complete collection of dramas from Metastasio. He died in 1803.

Hooley, Ernest Terah, an English promoter; born in Nottingham, in 1858. He

inherited a large fortune; began his career by buying stocks; and in 1895 went to London. The following year he was, it is said, the possessor of $50,000,000. In 1898 he went into bankruptcy for $10,000,000. He once secured an option on a bicycle tire company for $10,000,000 and three days later sold it for $20,000,000. He floated a beef-extract company and a bicycle concern, on each of which he made over $1,000,000; he made immense profits on sewing machine shares and the manufacture of a kind of liquor, and in various other ways. In his confession in the Court of Bankruptcy he alleged that much of his success was gained by buying the use of powerful aristocratic names for directors and officers of his several companies. While his good fortune lasted Hooley lived in great splendor. He purchased 60 baronial estates, among the finest in all England, and the magnificent palace of the dead millionaire, Barney Barnato. He gave $2,000,000 to the poor to celebrate the queen's jubilee, and presented a regal communion service of solid gold to St. Paul's Cathedral.

Hoop-ash (*Celtis crassifolia*), an American tree of the order *Urticaceæ*, found in the forests of Ohio and in the Western States. It is a fine tree, attains a height of 80 feet, and is employed for charcoal. Its fruit is round, and in size nearly equal to a pea.

Hooper, John, an English martyr of the Reformation; born in Somersetshire in 1495. He was appointed Bishop of Worcester by Edward VI.; but on the accession of Mary, he was required to recant his opinions, and on his refusal was condemned to the flames, in 1555. He wrote several books, including "Twelve Lectures on the Creed."

Hooper, Johnson, an American lawyer; born in North Carolina about 1815. He wrote: "Adventures of Captain Simon Suggs"; "Widow Rugby's Husband, and Other Alabama Tales." He died in Alabama in 1863.

Hooper, Lucy, an American poet; born in Newburyport, Mass., Feb. 4, 1816; wrote "Scenes from Real Life," a volume of prose sketches. Her complete poems appeared in 1848. She died in Brooklyn, N. Y., Aug. 1, 1841.

Hooper, Lucy Hamilton (Jones), an American poet; born in Philadelphia, Pa., Jan. 20, 1835; was for some time assistant editor of "Lippincott's Magazine." Her husband being United States vice-consul-general in France, she resided after 1874 in Paris, where she was correspondent for several American newspapers. She wrote: "Poems" (1864 and 1871); and the novels "Under the Tricolor" (1880) and "The Tsar's Window" (1881). She died in Paris, France, Aug. 31, 1893.

Hooper, Samuel, an American merchant and financier; born in Marblehead, Mass., Feb. 3, 1808; made a fortune in business and served in the Legislature and in Congress; wrote authoritative pamphlets on financial subjects, and was instrumental in having the National Banking Act passed. He died in Washington, D. C., Feb. 13, 1875.

Hooper, William, an American patriot; born in Boston, Mass., June 17, 1742; was graduated at Harvard College in 1760; practised law in North Carolina and early interested himself in the colonial struggle with Great Britain; was elected to the Continental Congress in 1774 and signed the Declaration of Independence July 4, 1776. He died in Hillsboro, N. C., October, 1790.

Hooping Cough, a spasmodic, infectious disease, usually of childhood, preceded by catarrh of from 3 to 14 days' duration. It sometimes terminates in six weeks, but often lasts as many months, though danger is usually over at the end of six weeks. Emphysema is a dangerous complication. In fatal cases, pulmonary collapse, bronchial inflammation, nervous exhaustion, and general debility are the chief factors. Various specifics have been suggested, the chief being belladonna, Croton-chloral-hydrate, bromide of potassium, and nitric acid with glycerin, Hooping cough is more fatal in some years than others, and it is always dangerous to treat this disease without medical advice. It depends chiefly on irritation of the pneumogastric nerve by some special germ, producing the paroxysmal character of the cough.

Hoopoe, a bird forming the type of a family generally classed with the bee-eaters or the honey-eaters, but also with the horn-

HOOPOE.

bills. The European hoopoe (*U. epops*) is about 12 inches long; it has a fine crest of pale cinnamon-red feathers, tipped with

black; upper surface on the whole ashy-brown; wings black, the coverts having white bars; throat and breast pale fawn; abdomen white, with black streaks and dashes. It has a very wide range, from Burma to the British Islands and Africa. It is a ground-feeder, preying chiefly on insects, and seems to delight in filth; it nests in cavities of trees or walls, and its eggs vary from four to seven. The hoopoe utters a loud double or treble "hoop," whence its name.

Hoosac Mountain, a part of the Green Mountain range in Western Massachusetts, through which is pierced the most notable railway tunnel in America. The Hoosac tunnel, which has a length of nearly 5 miles, was commenced in 1851 for the line between Boston and Albany, was twice abandoned, and was finally opened in 1875, having cost the State of Massachusetts about $18,000,000.

Hoosier State, a name for Indiana. The people of the State are called "Hoosiers," a word said to be a corruption of "hussar," or "husher," formerly a colloquial name for a fighter or a bully throughout the West.

Hoove, a disease in cattle, caused by eating too much green food, which inflates the stomach with gas.

Hop, in botany, *Humulus lupulus,* the only known species of the genus *Humulus.* The root, which is perennial, annually sends forth long, weak, rough, twining stems. The leaves somewhat resemble those of the vine, but are rougher, each pair with two curved stipules; the flowers are diœcious, the males, which are in axillary panicles, have five sepals, no petals, and five stamens; the females are in cones or catkins consisting of concave scales, each with a pair of minute flowers. It has an aromatic odor, sent forth by glands containing a resinous secretion. The hop is indigenous in England, but grows also in the United States, in Belgium, and Bavaria. It was known to the Romans as *Lupus salictarius.* Packets of it put in pillows have a narcotic effect, and tend to induce sleep. It is sometimes prescribed as a tonic. The young shoots blanched have been eaten as asparagus, and the roots used as a substitute for sarsaparilla. *Bryonia dioica* is sometimes called wild hop. The native hop of Australia is (1) *Dodonœa,* the seed vessels of which are there used in the manufacture of beer; (2) *Daviesia lætifolia.* Hops are boiled with the wort in brewing beer. They impart a bitter taste and aromatic flavor, and prevent fermentation from being too rapid. They owe their effect to a chemical principle called lupuline.

In pharmacy *lupulus* is the designation of hop. The dried catkins of the female plant of *H. lupulus* are from the common hops. They are used to prepare infusion of hop, tincture of hop, and extract of hop. Hops are tonic and stomachic, and slightly narcotic; with malt they form the materials from which beer is, or should be made.

Hope College, a coeducational institution in Holland, Mich.; founded in 1866 under the auspices of the Reformed Church in America; has endowment of $325,000; grounds and buildings valued at over $275,000; volumes in the library, about 17,000; ordinary income, about $30,000; average number of faculty, 20; average student attendance, 370; graduates, over 450.

Hop Clover (*Trifolium procumbens*), a plant of the order *Leguminosæ,* distinguished from other species of clover by its bunch of yellow flowers, which wither to the bright brown of a strobile of hops.

Hope, Anthony. See HAWKINS, ANTHONY H.

Hope, James Barron, an American poet; born in Norfolk, Va., March 23, 1827. He served in the Confederate army in the Civil War. Among his poems are: "Leoni di Monti" (1857); "Under the Empire, or the Story of Madelon" (1878); and "Arms and the Man" (1882). He died in Norfolk, Sept. 15, 1887.

Hope, Thomas, an English author; born in London in 1774. He first attracted attention by the splendid decorations which he bestowed on the interior of his mansion in Duchess Street, Portland Place, London, a description of which appeared in his book on "Household Furniture" (1805). "Anastasius, or Memoirs of a Modern Greek at the close of the 18th Century," is his masterpiece, and by many was ascribed to Lord Byron, who was greatly flattered by the rumor. He died Feb. 3, 1831.

His third son, ALEXANDER JAMES BERESFORD-HOPE; born in 1820, was educated at Harrow and Trinity College, Cambridge, where he graduated B. A. in 1841; was the principal founder of St. Augustine's Missionary College at Canterbury; and was also a proprietor of the "Saturday Review." He died Oct. 20, 1887.

Hopetoun, John Adrian Louis Hope, Earl of, an English statesman; born in Hopetoun, England, Sept. 25, 1860; was educated at Eton School; was successively lord-in-waiting; lord high commissioner to the General Assembly of Church of Scotland; governor of Victoria; paymaster-general; Brigadier-General Royal Company of Archers; and Jan. 1, 1901, was sworn in as first Governor-General of the Federated Australian colonies; resigned in 1902.

Hopfen, Hans von (hop'fen), a German poet and novelist; born in Munich, Jan. 3, 1835, winning note at the university there. His "Necessity," and other poems

of equal merit, are characterized by originality and picturesqueness, while his novels — notably "The Old Practitioner" — show him a graceful and graphic delineator of character and customs.

Hop Flea, or **Tooth-legged Beetle,** a very small coleopterous insect, not quite one-tenth of an inch long, which often does much mischief in hop plantations in spring, devouring the tender tops of the young shoots. It is of the same genus as the turnip fly, so destructive to turnips.

Hopkins, Alphonso Alvah, an American author; born in Burlington Flats, N. Y., March 27, 1843; he wrote in verse: "Asleep in the Sanctum"; "Geraldine," a metrical romance modeled after "Lucile"; the novels, "His Prison Bars" (1874); "Sinner and Saint" (1881); "Life of General Clinton Fisk" (1888); "Ballads of Brotherhood" (1900), etc.

Hopkins, Cyril George, an American educator; born near Chatfield, Minn., July 22, 1866; was graduated at South Dakota Agricultural College in 1890; studied agricultural chemistry in Göttingen, Germany, 1899–1900; was assistant in chemistry at Agricultural College, Brookings, S. D., 1890–1892 and 1893–1894; at Cornell University 1892–1893; acting Professor of Pharmacy at South Dakota Agricultural College 1893–1894; and became Professor of Agronomy in the University of Illinois in 1900. He wrote "Chemistry of the Corn Kernel" (1898); "Improvement in the Chemical Composition of the Corn Kernel" (1899); etc.

Hopkins, Edward Washburn, an American educator; born in Northampton, Mass., in September, 1857; became Professor of Sanskrit at Yale, successor of Professor Whitney; he wrote "Mutual Relations of the Four Castes in Manu"; "Translation of Laws in Manu"; "Social and Military Position of the Ruling Caste in Ancient India"; "The Religions of India"; "The Great Epic of India"; etc.

Hopkins, Henry, an American educator; born in Williamstown, Mass., Nov. 30, 1837; was graduated at Williams College in 1858; studied for two years in the Union Theological Seminary in New York city; and was ordained in the Congregational Church in 1860. In 1861 he was commissioned a chaplain in the Union army, and served in the hospital in Alexandria, Va., till 1864, when he was appointed chaplain of the 120th New York volunteers. After the war he held pastorates in Westfield, Mass., and Kansas City, Mo.; engaged extensively in missionary and charity work, and published addresses on municipal and educational subjects. He became president of Williams College, Williamstown, Mass., in 1902. He died Aug. 18, 1908.

Hopkins, John Henry, an American clergyman; born in Dublin, Ireland, Jan. 30, 1792. He was originally an iron manufacturer, afterward a lawyer, and won eminence by his vigorous and versatile writings. He was consecrated the first Protestant Episcopal bishop of Vermont in 1832. Among his works are: "History of the Confessional"; "The End of Controversy Controverted"; "The Primitive Church"; "Essay on Gothic Architecture"; "The Church of Rome in her Primitive Purity"; "Scriptural View of Slavery," a defense of the institution; "Law of Ritualism"; "History of the Church," in verse; Twelve Canzonets, words and music. He died in Rock Point, Vt., Jan. 9, 1868.

Hopkins, John Henry, an American clergyman, son of the preceding; born in Pittsburg, Pa., Oct. 28, 1820. He founded and long edited the "Church Journal." He wrote: "Carols, Hymns, and Songs"; "Poems by the Wayside"; "Life of Bishop Hopkins"; "Faith and Order of the Protestant Church in the United States"; etc. He also translated Goethe's "Autobiography." He died near Hudson, N. Y., Aug. 13, 1891.

Hopkins, Johns, an American philanthropist; born in Anne Arundel co., Md., May 19, 1795. His parents, Quakers, gave him a fair education and the training of a farmer. At the age of 17, however, he went to Baltimore, there became a grocer, and in 1822 founded the house of Hopkins and Brothers. From the grocer's business he retired in 1847 with a large fortune, which he employed in banking and railway operations. In 1873 he gave property worth $4,500,000 to found a free hospital; he presented Baltimore with a public park, and he also gave over $3,000,000 to found the Johns Hopkins University in Baltimore. He died Dec. 24, 1873.

Hopkins, Louisa Payson, an American writer of juvenile literature; born in Portland, Me., Feb. 24, 1812. Her works were designed chiefly to explain Bible literature to children, and include "The Parson's Daughter"; "The Young Christian Encouraged"; "Henry Langdon"; etc. She died Jan. 24, 1862.

Hopkins, Mark, an American educator; born in Stockbridge, Mass., Feb. 4, 1802. He was president of Williams College in 1836–1872, and for 30 years president of the American Board of Commissioners for Foreign Missions. Among his works are "Evidences of Christianity"; "The Law of Love, and Love as a Law"; and "An Outline Study of Man." He died in Williamstown, Mass., June 17, 1887.

Hopkins, Moses Aaron, an American clergyman; born in Montgomery co., Va., Dec. 25, 1846; was of African descent and

born a slave; learned to read at 20; and became an evangelist. In 1877 he was made pastor of a church in Franklinton, N. C., and in 1885 was appointed United States Minister to Liberia. He died in Monrovia, Liberia, Aug. 3, 1886.

Hopkins, Samuel, an American divine; born in Waterbury, Conn., in 1721. He was a pious and zealous man, with considerable talents, and almost incredible powers of application; but his theological opinions gave rise to much controversy. He published numerous sermons, and earnestly advocated the abolition of slavery in the American States. From the year 1780 he presided over a congregation at Newport, R. I. He died in 1803.

Hopkins, Stephen, an American statesman; born in Providence, R. I., March 7, 1707. In 1732 he was elected a representative to the General Assembly from Scituate, and was chosen speaker of that body in 1741. In 1751 he was appointed chief-justice of the superior court of Rhode Island, and, in 1756, was elected governor. He signed the Declaration of Independence. After this he was several times chosen a member of Congress. He died in Providence, July 13, 1785.

Hopkinsians, the name given to those who adopt the theological opinions of Samuel Hopkins. They are not a distinct sect, but are pretty numerous in the United States, in some of the Christian bodies of which the tenets are generally Calvinistic. They hold most of the Calvinistic doctrines, and even in their most extreme form, but they entirely reject the doctrine of imputation, both the imputation of Adam's sin and of Christ's righteousness. The fundamental doctrine of the Hopkinsian system, however, is, that all virtue and true holiness consist in disinterested benevolence, and that all sin is selfishness — the self-love which leads a man to give his first regard even to his own eternal interests being condemned as sinful.

Hopkinson, Francis, an American political writer; born in Philadelphia, Sept. 21, 1737. He wrote: "The Pretty Story" (1774); "The Prophecy" (1776); "The Political Catechism" (1777). He also wrote poems and essays. The "Miscellaneous Essays, and Occasional Writings" appeared posthumously. His humorous ballad, "The Battle of the Keg," was widely known. He was one of the signers of the Declaration of Independence. He died May 9, 1791.

Hopkinson, Joseph, an American jurist, son of Francis; born in Philadelphia, Nov. 12, 1770; was one of the ablest lawyers of his day. He wrote the famous patriotic song, "Hail Columbia" (1798), for the benefit of an actor, calling it at first the "President's March." He died in Philadelphia, Jan. 15, 1842.

Hopkinsville, a city and county-seat of Christian co., Ky., on the Louisville and Nashville, and the Ohio Valley railroads; 73 miles N. W. of Nashville, Tenn. It is the seat of Bethel Female and Southern Kentucky Colleges, and Western Kentucky Insane Asylum, and has manufactures of tobacco, lime, brick, wagons, and carriages. There are daily and weekly newspapers, electric lights, public library, a National bank, Hopkinsville high school, and an assessed property valuation of over $2,000,000. Pop. (1900) 7,280; (1910) 9,419.

Hopper, Isaac Tatem, an American philanthropist; born in Deptford, N. J., Dec. 3, 1771; joined the Hicksite branch of the Quaker sect; early distinguished himself as a benefactor of slaves, convicts and the poor, and was long treasurer of the Anti-Slavery Society. He died in New York city, May 7, 1852.

Hoppin, Augustus, an American illustrator; born in Providence, R. I., July 13, 1828. He was originally a lawyer. Besides illustrating works by many well-known authors, he illustrated his own books: "On the Nile" (1871); "Recollections of Anton House, by C. Anton" (1881), a novel; "Two Compton Boys" (1884); "Married for Fun" (1885), a romance, etc. He died in 1896.

Hoppin, James Mason, an American educator and writer; born in Providence, R. I., Jan. 17, 1820; became Professor of the History of Art at Yale University; works include: "Life of Rear-Admiral Foote"; "Greek Art on Greek Soil"; "Old England," a highly praised book of travel; "The Early Renaissance"; etc. He died Nov. 15, 1906.

Hopps, John Page, an English clergyman; born in London, Nov. 6, 1834. At first a Baptist minister, he joined the Unitarians, holding pastorates at Sheffield, Glasgow, and Leicester. He was an active social reformer and advocate of coöperation. Among his numerous works are: "Seven Lectures for the People"; "Beside the Still Waters"; "A Scientific Basis of Belief in Future Life"; "Future Probation," etc.

Hop Tree, an American shrub of the rue family (*Rutaceæ*), also called shrubby trefoil, is planted as an ornamental plant. Its fruit is intensely bitter, and is a poor substitute for hops.

Hop Worm, a form of caterpillar. In June, July, and August, the leaves of the hop-vine are often devoured by these active, slender, grass-green caterpillars, with but four pairs of prop-legs. They may be shaken off and the vines saved by daily spraying with whale-oil soapsuds or kerosene emulsion.

Hor (hōr), in Arabia Petræa, a mountain of a conical form in the range of Mount Seir, on the E. side of the Arabah, or great valley running from the Dead Sea to the Elanitic Gulf. It is an irregularly truncated cone, with three rugged peaks, overlooking a wilderness of heights, cliffs, ravines, and deserts. On this mountain Aaron died, alone with his brother and son (Num. xx: 22–29; xxxiii: 38). It is still called Jabel Neby Harboon, "mount of the prophet Aaron"; and on its summit stands a Mohammedan tomb of Aaron, on the site of a still more ancient structure, and marking perhaps the place of his burial.

Horæ (hō′rē), in classical mythology, divinities regarded in two points of view — as the goddesses of the seasons, and of the hours of the day. Their duty was to hold the gates of heaven, which they opened to send forth the chariot of the sun in the morning, and receive it again in the evening. These goddesses are frequently depicted as forming the train of Aphrodite or Venus.

Horæ Canonicæ (hō′rē kan-ōn′ē-kē, or hō′ri-kan-ōn′ ē-kī), the canonical hours at which religious services are held. In time of persecution a night service was held called Nocturns, which was, however, at a later period merged into Lauds — the thanksgiving for the dawn of day, and the whole was called Matins. But when Matins, or Nocturns, are retained they take place before Lauds. The following is the order of the canonical hours: Lauds, at daybreak; Prime, or first hour, a later service; Tierce, or third hour, at 9 A. M.; Sext, or sixth hour, at noon; Nones, or ninth hour, at 3 P. M.; Vespers, or evening service; Compline, or final service, at bedtime. Each of these has fixed Psalms, except Vespers, which has certain Psalms read in course, and a Canticle. The Anglo-Saxon names of these services were uhtsang, primesang, undersang, middaysang, noonsang, evensang, and nightsang. The book for these offices came to be called Breviary toward the end of the 11th century.

Horapollo (hōr-ap′ōl-lo), the alleged author of a work in Egyptian hieroglyphics pretended to have been translated from the Egyptian into Greek. By many authorities the book is supposed to have been written about the 5th century and translated as late as the 15th.

Horatii (hō-rā′shē-ī), three Roman brothers, who, according to tradition, in the reign of Tullus Hostilius engaged three Alban brothers (the Curiatii), in order to decide the supremacy between Rome and Alba. Victory went to Rome, and the sole surviving Horatius was triumphantly conducted back to the city. But his sister had been betrothed to one of the Curiatii, and her demonstrative grief so enraged Horatius that he stabbed her. For this he was condemned to death, but his father and the people obtained his pardon.

Horatius Cocles, a hero of ancient Rome. When the Etrurian King Porsenna, to whom the banished Tarquins had fled, advanced against Rome (507 B. C.), tradition relates that a hero of this name, along with Spurius Lartius and Titus Herminius, held the Sublician bridge over the Tiber against the enemy, while the Romans were breaking it down behind them. When the work was nearly finished Horatius sent back his two companions, and continued to defend the bridge till the crashing of the falling timbers and the shouts of the Romans announced the completion of the work. Though enfeebled by wounds he then plunged into the stream with his armor, and in the midst of the darts of the enemy reached the opposite bank of the Tiber in safety. The nation rewarded him with a monument and as much land as he could plow around in one day. His fellow citizens hailed him as the savior of his country, and deprived themselves of food when famine was raging so that he might not want. He is said to have been a relation of the Horatii, and to have received the surname of Cocles from the circumstance of having lost an eye in battle.

Horatius Flaccus, Quintus, a Latin lyric poet, commonly known by the name of HORACE; born near Venusia, a city lying on the borders of Lucania and Apulia, Dec. 8, 65 B. C. His father was a freedman who had been manumitted before the poet's birth, and was by occupation a collector of taxes, from the proceeds of which office he had saved enough to purchase the farm where the poet was born. He determined to give his son the best education he could, possibly discerning already signs of genius in him, and for this purpose he removed with his son, then probably about 12 years old, to Rome. Though not rich he caused him to be taught the liberal arts, supported him in the same manner as youths of the best families lived, and was himself a watchful guardian of his morals and an example of virtue, as the grateful son informs us in his "Satires" (i. 6, 66–92). He was instructed in the Greek and Latin languages, the text-books being Homer for the former and Livius Andronicus for the latter. One of his teachers was Orbilius Pupillus, whose liberal use of the rod has been mentioned by Horace in the 11th epistle of his second book. At the age of 18 years he went to Athens, then a sort of finishing school or university for Roman youth. During his stay in this city the most important changes were taking place in Rome. Julius Cæsar was assassinated; Brutus came to Athens to prepare for the war which was to follow and received into his army the Roman youth who studied

Horatius Flaccus

there. Among these was Horace, who followed Brutus to Macedonia; while in Rome, M. Lepidus, M. Antony, and Octavius Cæsar declared themselves triumvirs of the republic for five years, and divided the provinces among themselves. Horace was legionary tribune in the army of Brutus, and fought in the last battle for the freedom of Rome, at Philippi in Macedonia (42 B. C.). Brutus and Cassius fell; Horace saved his life by flight. He himself playfully mentions his flight, and his throwing away his shield (Od. ii. 7, Ep. ii. 2, 46), which has caused some one to accuse him of disgraceful cowardice; but it was surely little to his discredit to flee with the other remnants of an utterly shattered army. Liberty of return was granted to the vanquished, and Horace availed himself of the opportunity, and from this time took no direct part in public affairs.

His father was now dead; his paternal estate was confiscated; poverty, as he himself says, compelled him to make verses. Whether this expression was meant literally, as many believe, is uncertain, as he had a moderate support from the station of clerk to the quæstor, a situation which he had been able to purchase. But he could not have employed his leisure hours in a nobler manner than in the exercise of a talent which nature had so richly bestowed on him; nor could he have chosen a better way to soothe those feelings which, in contemplating the occurrences of his time, must often have powerfully disturbed his inmost soul. The talent which he displayed procured him the friendship of two eminent poets, Vergil and Varius, and to them he was indebted for his first acquaintance with Mæcenas, a refined man of the world, who without leaving his private station, was the friend and confidant of Augustus Cæsar, and who expended his wealth willingly for the encouragement of literature and the arts. Nine months after, Mæcenas received Horace into the circle of his intimate friends and after some years presented him with the Sabine estate, which Horace so often mentions in his poems. The situation of this farm was in the valley of Utica, within view of the mountain Lucretilis, part of which is now called Mount Gennaro, and near the Digentia about 15 miles from Tibur (Tivoli). It was sufficient to maintain him in ease and comfort during the rest of his life. He had also a cottage at Tibur, and at Rome or one or other of his country residences the latter part of his life was spent. If the poet did not acquire a still more splendid fortune, the fault lay in himself. He was at last introduced to Augustus, and though he came to be on a footing of great familiarity with him, and sang his praises in several of his poems, he never sought favors at his hands. According to Suetonius he declined a proposal which Augustus made to him through Mæcenas, to enter his service and undertake the management of his private correspondence, under the pretense of ill health. This refusal did not alienate the favor of the emperor, however, with whom, as with many others of the most distinguished men at Rome, Horace continued to live on terms of mutual esteem and friendship. He died Nov. 17, 8 B. C., the same year as his friend and patron Mæcenas, near whose tomb in the Esquiline he was buried. Almost all his poems addressed to Mæcenas celebrate love and freedom, and express indifference to that happiness which depends on the will of another, and contentedness in a situation in which he found himself rich above his wishes. He did not, however, make a parade of rusticity, or deem a strict morose manner of life necessary to virtue; he rather displayed a genuine urbanity, which finds a tone adapted to every circumstance. He has left us four books of odes; a book of epodes, so called, which differ from the odes not only in meter, the second verse being always shorter than the first, but also in the sentiment, which would rather rank them among the satires, in which he took Archilochus as a pattern; two books of satires, and two books of epistles, one of which (that addressed to the Pisos) is often cited as a separate work, under the title of "Ars Poetica."

In appreciating Horace as a lyric poet it must not be forgotten that he was the first among the Romans who formed the Roman language for lyric poetry and applied it with no small labor to the difficult Greek meters. Uninterrupted study and perseverance only could have effected so masterly a structure of the verse. It is said, indeed, and it cannot be denied, that the greater part of the odes of Horace are only imitations or translations of Greek lyrists—Archilochus, Alcæus, Stesichorus, Sappho, and others. Many have made use of this objection to detract from the poetical fame of Horace. But granting that originality cannot be attributed to Horace as a lyric poet, no one can deny it to him as a satirist. As didactic satire in general was a Roman invention, so it was Horace who, following Ennius, Pacuvius, and Lucilius, by whom its form and object had been defined, gave it a tone and polish of its own. The satires of Horace, among which may be included his epistles, since they differ little from the others, except in their title and in being addressed to an individual, have more or less a comic character, and are to be judged from this point of view.

Horace does not expose vices so much as follies, which he places in a ridiculous light; he sees more folly than vice in the world, and even declares himself not exempt from a portion of it. Nevertheless he seeks to amend follies as far as possible, because he

considers them pernicious. To prejudices and errors he opposes his philosophy, which, instead of forbidding the enjoyment of life, only urges wise vigilance, and teaches virtue, without which happiness is impossible. The agreeable manner in which he philosophizes the salt with which he seasons his thoughts, the delicacy and ease with which he expresses himself, afford the most charming entertainment. We know not which most to admire, his accurate knowledge of the human heart and of the different classes of men, his love of truth, candor, and ingenuousness, the agreeable tone, the urbanity, which, in seriousness or derision, never forsakes him, the delicacy with which he presents the ridiculous without bringing it out in bold relief, or his skill in delineating characters. His ridicule is not bitter, and the person ridiculed might laugh at the picture. He manages hexameter with such skill that he seems to tread the natural paths of social conversation.

Horeb, a mountain belonging to the same ridge as Mount Sinai, where is still pointed out the rock from which water issued at the blow of Moses.

Horehound, or **Hoarhound,** in botany, a plant so hoary as to be almost woolly; the leaves are broadly ovate and crenate; the whorls of flowers dense; calyx oblong, with 10 short spinous teeth; the corolla white, labiate, the upper lip long, bifid. Wild in Continental Europe, North Africa, Western and Southern Asia, etc. Black or stinking horehound is *Ballota nigra,* or the genus *Ballota;* wild horehound, *Eupatorium teucrifolium.* The plant contains a bitter principle and a volatile oil. It is used as a tonic, expectorant, and alternative for coughs. In the form of infusion or of bitter-sweet lozenges, horehound is a popular remedy for coughs.

HOREHOUND.

Horicon (hō′rē-kon), a name applied to Lake George by the novelist Cooper. It is popularly believed that Horicon is a word of Indian origin, but the Red Men called the lake Andialarocte, "there the lake shuts itself." Jogues, the French missionary pioneer, named it St. Sacramente, because he discovered it the day before that festival.

Horizon, the visual circle of the firmament. It is not at right angles to a vertical line at the place, for if vision be unimpeded, say when one looks from a vessel's deck on a clear day, the rotundity of the earth allows him to see a little more of the sky than if his eye were at the surface of the sphere. If he looks from a mountain top the error becomes of consequence. The term "sensible," "visible," or "physical" horizon is therefore often used, though not quite accurately, for a plane supposed to be extended from the observer's eye at right angles to a vertical line at the place and extending to the celestial vault. The horizon convenient for astronomical purposes, and called the astronomical, or rational horizon, is different from this. The spectator's eye is supposed to be, not at the surface, but at the center of the earth, with the planet transparent enough not to impede vision. The astronomical horizon of the Lick observatory would be obtained by supposing a line drawn downward from that spot to the earth's center, and a plane everywhere at right angles to that line, to extend from the latter spot to the celestial vault. It would form a great circle, both of the earth and of the heavens. Sometimes what is called an "artificial horizon" is needed, and is formed by the reflecting surface of a fluid. In geology the term is used with regard to the apparent age of strata. Strata which appear, broadly speaking, contemporaneous or homotaxial are said to be on the same horizon.

Horizon, Artificial, a shallow basin of mercury, covered, when necessary, to protect it from the wind, with a roof made of glass plates, whose surfaces are parallel. It is used in connection with a sextant in observations on land, and it derives its name from the contradistinction to the sea (or natural) horizon which is used by navigators. The angle between the direct and reflected rays from any celestial body is twice the true altitude of the body, and this is the angle measured with the sextant and artificial horizon. These are of great use to exploring parties and eclipse expeditions in determining their time and latitude, and in the hands of skillful observers are capable of a considerable degree of precision.

Horizon Glasses, in optics, the two speculums on one of the radii of a quadrant or sextant. The one half of the fore horizon glass is silvered, while the other half is transparent, in order that an object may be seen directly through it. The back horizon glass is silvered above and below, but has a transparent stripe across the middle, through which the horizon can be seen.

Hörmann, Ludwig von (hur′män), a German writer; born in Feldkirch, Oct. 12, 1837. He was a philologist and librarian

by profession, and was at one time professor in the Academy at Innsbruck, and after 1878 was librarian of the university there. His fame depends upon: "Tyrolese Types"; "The Life of the People of the Tyrol"; and numerous studies of conditions and manners among the natives of the Alpine region.

Hormayr, Joseph, Freiherr von, a German-Austrian historian; born in Innsbruck, Jan. 20, 1782. In 1803 he was appointed keeper of the state and royal archives of Austria, and in 1816 imperial historiographer. Hormayr in 1828 entered the service of Bavaria, and, after four years' activity in the department for foreign affairs, was nominated minister of Bavaria to Hanover from 1832, and to the Hanse towns from 1837. From 1846 to his death he was head of the Bavarian archives. He published several works on the history of Tyrol, an "Austrian Plutarch," and a general history of modern times. He died Oct. 5, 1848.

Hormuz. See ORMUZ.

Hormuzd. See ORMUZD.

Horn, a substance which may be divided into two distinct classes. First, the branched, bony horns of the stag genus, and the simple, laminated horns of the ox genus, and other kindred genera. The first of these kinds of horn is applied to the same purposes as bone and ivory, and the manufacture is almost similar. The other kind of horn, found in the ox, antelope, goat, and sheep, consists of a number of conical sheaths inserted one into another, the innermost resting upon the vascular membrane covering the bony core. The tip is very dense, and the layers of which it is composed are scarcely distinguishable. This kind of horn appears to consist of coagulated albumen; and there is a regular connection between horns, nails, claws, hoofs, scales, hair, feathers, and even skin. The horns of oxen are the principal ones used for manufacturing purposes; the horns of bulls and cows being preferred to those of bullocks, which are thin and of a coarse texture. The horns of goats and sheep are whiter and more transparent than those of any other animals.

In horn manufacture, the first process necessary is to remove the core. This is effected by steeping the horn in water for about a month, when the horny sheath becomes so softened that the core can be readily withdrawn. The cores are not wasted, but are afterward burnt, forming bone ash, a substance valuable in making cupels for assaying purposes. They are also used in other ways — for making glue, stiffening for cloth dresses, and for manure. The solid tip of the horn, after being sawn off, is used for making knife handles, umbrella handles, etc. After being divided into thin laminæ, the remainder of the horn is used for various purposes. The lower part is frequently used for making combs, while the middle is used for making lanterns, etc. To prepare the horn for use, it is softened by means of boiling water, and then usually held in the flame of a fire till it gains the temperature of melting lead, and becomes so soft as to be semi-fluid. While in this state, the slitting is performed by means of a pointed knife resembling a pruning knife; then, by means of two pairs of pincers, the cylinder, or cone of horn, is opened till it is nearly flat. A number of pieces are then exposed to pressure between plates of iron previously heated and greased. The degree of the pressure depends upon the required use of the horn. The thin sheets of horn are then scraped with a blunt or wire-edged draw knife upon a board covered with hide. After being smoothed and brought to the required thinness, they are polished with a woolen rag dipped in charcoal dust, a little water being added at times. After being rubbed with rotten stone, they are finally polished with horn shavings.

When horn is to be converted into combs, the pressure requires to be as slight as possible, lest, by the breaking of the grain, the teeth become liable to split. Horns for combs are roughly cut by a hatchet or saw to the required shape, and then finished by rasping and scraping. Ornamental horn combs, with open work, are largely manufactured in France. Snuff boxes, combs, and other ornamental articles, are often made by pressing horn shavings, after reducing them to a soft state by means of heat. Drinking horns are made by sawing the horn to the required length, scalding and roasting it over a fire, placing it in a conical wooden mold, and bringing it into the required shape by driving a wooden plug firmly into the interior. It is afterward fixed on a lathe, when cold and hard, and turned and polished both on the inside and outside. The bottom, a round flat piece of horn, is dropped in at the larger end of the cone of horn, while the latter is warm. At the smaller end of the vessel is a groove into which the bottom slips, and as the horn contracts in cooling, so the bottom becomes firmly fixed, and the drinking horn water-tight. The process of dyeing horn of different colors is very easy. It is usually colored of a rich reddish brown, and spotted so as to imitate tortoise shell. The whole of the refuse of horn manufacture is valuable. Hoofs and horn cuttings are used for making prussiate of potash and prussian blue; and the clippings of the combmaker are used as manure. An artificial horn is made from the gelatine obtained from bones by muriatic acid, and converting it into a horny substance by tanning.

Horn, Cape, commonly spoken of as the extreme S. point of America, is a steep, black, bare mountain headland of one of the small islands of the Fuegian Archipelago. It was named Hoorn, anglicized Horn, "the Horn," when rounded in 1616 by the Dutch navigators, Lemaire and Schouten. It was sighted by Drake in 1578. The dangerous doubling of Cape Horn is avoided by steamers, which now pass through the Strait of Magellan.

Horn, Charles Edward, an Anglo-American musician; born in London, England, in 1776; achieved success as a singer from 1809 to 1814, and wrote popular songs including "The Deep, Deep Sea"; "Even as the Sun"; and "Cherry Ripe." His masterpiece is an air fitting "I know a Bank where the Wild Thyme Grows" in Shakespeare's "Midsummer Night's Dream." He died in Boston, Mass., June 10, 1848.

Horn, Franz Christoph (horn), a German historian; born July 30, 1781. His romances and tales, "Guiscardo, the Poet"; "Battle and Victory," and "The Wandering Jew," were once widely read, but are now forgotten. More noteworthy are: "Outlines of the History and Nature of German Polite Literature from 1790 to 1818"; "German Poetry and Rhetoric from Luther's Time to Our Own"; "Shakespeare's Plays," a valuable critical work. He died July 19, 1837.

Horn, Hoorne, or **Hornes, Philip, Count van,** a Flemish soldier and statesman; born in 1518; was the son of Joseph

COUNT VAN HORN.

de Montmorency-Nivelle, and of Anne of Egmont, and stepson of John, Count van Horn, who constituted him and his brother his heirs on the condition of assuming his name. Philip gradually rose to be governor of Gueldres and Zütphen, admiral of the fleet, and councillor of state. He fought at St. Quentin in 1557, and at Gravelines in

HORNBILL.

1558, and in 1559 accompanied Philip to Spain. On his return he joined the Prince of Orange and Egmont in resistance to Philip. On the arrival of Alva at Brussels he was arrested, in September, 1567, on a charge of high treason, and he and Egmont were beheaded in June, 1568.

Hornaday, William Temple, an American naturalist; born near Plainfield, Ind., Dec. 1, 1854. He was for a number of years chief taxidermist of the United States National Museum, Washington, and in 1896 became director of the New York Zoölogical Park. He wrote: "Two Years in the Jungle"; "The Buffalo Hunt"; "Free Rum on the Congo"; "Taxidermy and Zoölogical Collecting"; "Canoe and Rifle on the Orinoco"; etc.

Hornbeam (*Carpīnus Betulus*, natural order *Cupuliferæ*), a small bushy tree common in Great Britain, and often used in hedges, as it stands cutting and in age becomes very stiff. The wood is white, tough, and hard, and is used in turnery, for cogs of wheels, etc. The inner bark yields a yellow dye. The American hornbeam (*C. americana*) is a small tree sparingly diffused over the whole of the United States. The wood is fine-grained, tenacious, and very compact.

Hornbills, a remarkable group of birds confined to Southern Asia and Africa, akin to the kingfishers and the toucans, remarkable for the very large size of the bill, and for an extraordinary horny protuberance by which it is surmounted, nearly as large as the bill itself, and of cellular structure within. The rhinoceros hornbill is almost

the size of a turkey, of a black color, except on the lower part of the belly and tip of the tail, which are white. It has a sharp-pointed, slightly curved bill, about 10 inches long, and furnished at the base of the upper mandible with an immense appendage in the form of an inverted horn.

Hornbook, the primer or apparatus for learning the elements of reading, used in England before the days of printing, and common down to the time of George II. It consisted of a single leaf, containing on one side the alphabet, large and small, in black letter or in Roman. Then followed a form of exorcism and the Lord's Prayer, and, as a finale, the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn in front — hence the name of hornbook. Common as hornbooks were at one time, copies of them are now rare.

Hornblende (-blend), according to Dana, a sub-variety of aluminous amphibole, ranked with pargasite as aluminous magnesia, lime-iron amphibole. It consists of the greenish black and black kinds, whether in stout crystals or long-bladed, columnar fibrous or massive granular. According to Lyell hornblende is one of the five most abundant simple minerals of which rocks are composed, the others being felspar, quartz, mica, and carbonate of lime. It is closely akin to augite, but the forms of the crystals in the two species are different, and the cleavage parallel to the faces of the oblique prism in hornblende are more strongly marked than the corresponding cleavage in augite. The two are very rarely associated in the same rock and when they are so, hornblende is in the mass of the rock, where cooling was slow and the augite in cavities, where it was probably rapid.

Horne, Richard Henry (or RICHARD HENGIST HORNE, as he called himself after his return from Australia), an English poet and miscellaneous author; born in London, England, Jan. 1, 1803; was educated at the Royal Military College, Sandhurst, with a view to entering the military service of the East India Company. Before receiving an appointment, however, he joined the Mexican navy and served through the war against Spain, being present at the siege of Vera Cruz and the capture of San Juan de Ulloa. On the conclusion of the war he was prostrated for a time by yellow fever, and after his recovery he traveled in the United States, visiting several Indian encampments. Near the falls of Niagara he accidentally broke two of his ribs, and soon afterward he was shipwrecked in the Gulf of St. Lawrence. This checkered period of his career was fittingly closed by the return voyage from Nova Scotia, during which the crew mutinied and the ship afterward took fire. In 1828 he began his literary career by contributing to the "Athenæum" a poem entitled "Hecatompylos," but his first separate publication was the "Exposition of the False Medium and Barriers excluding Men of Genius from the Public" (1833). In the following year appeared his "Spirit of Peers and People: a National Tragicomedy," and in 1836–1837 he edited the "Monthly Repository." In 1837 he published his first drama, "Cosmo de' Medici: a Historical Tragedy" and in the same year he issued a one-act tragedy, "The Death of Marlowe." "Gregory VII.: A Tragedy" was published in 1840, with an introductory "Essay on Tragic Influence." He was associated with Leigh Hunt, Miss Barrett, and others in producing "The Poems of Geoffrey Chaucer Modernized" (1841). During the next two years he was occupied as a member of the Royal Commission on the Employment of Children and Young Persons in Mines and Factories, whose report called forth Miss Barrett's well-known "Cry of the Children." In 1843 he published "Orion, an Epic Poem in Ten Books," which went through six editions in the year of its publication. The first three editions were sold at one farthing per copy, in sarcastic appeal to an unpoetic public. "A New Spirit of the Age" (1844), in which he coöperated with Mrs. Browning and Robert Bell, consisted of a large number of appreciations of distinguished contemporaries.

In 1852 he accompanied William Howitt to Australia, where he was appointed successively commander of the gold escort of Victoria, commissioner of crown lands for the gold fields, magistrate at the Blue mountains, water supply commissioner, and registrar of mines. His Australian experiences furnished material for his "Australian Facts and Prospects" (1859). Under the impression that the government of Victoria had not treated him fairly, he returned to England in 1869. From 1874 till the end of his life he was in receipt of a civil list pension. He died in Margate, March 13, 1884. In addition to the works above enumerated the following should be mentioned: "Judas Iscariot: A Miracle Play, in Two Acts" (1848); "The Dreamer and the Worker: a Story of the Present Time" (1851); "Prometheus the Fire-Bringer" (1864); "The South-Sea Sisters: A Lyric Masque" (1866); "The Great Peace-Maker: A Submarine Dialogue" (1872), a poem on the laying of the Dover-Calais cable; "Laura Dibalzo, or the Patriot Martyrs: a Tragedy" (1880); "King Nihil's Round Table, or the Regicide's Symposium: A Dramatic Scene" (1881); "The Last Words of Cleanthes: a Poem" (1883); etc.

Horne, Thomas Hartwell, an English Biblical critic; born Oct. 20, 1780. He was educated at Christ's Hospital, and after-

ward became clerk to a barrister. His leisure hours were devoted to the study of the Bible, and in 1818 he published his "Introduction to the Critical Study and Knowledge of the Holy Scriptures," a work which procured for him admission into orders without the usual preliminaries. He died June 27, 1860.

Horned Screamer, a South American grallatorial bird, larger than a goose, with a long, slender, mobile horn projecting from the forehead, whence the epithet, while its strong piercing voice gains for it the appellation of screamer. Its color is blackish, with a red spot on the shoulder.

Horned Toad, also called HORNED FROG and HORNED LIZARD (*Phrynosoma cornutum*), a lizard belonging to the *Agamidæ*. It is found in Mexico, Texas, Oregon, and California.

Hornellsville, a city in Steuben co., N. Y., on the Canisteo river, and on the Central New York and Western, and the Erie railroads; 60 miles S. of Rochester. It has important manufactures, including sash, doors, and blinds, furniture, leather, shoes, carriages, wire fencings, brick and tile, silk, veilings, gloves, and machinery. It is the seat of St. Ann's Academy, and Mercy Hospital, and has daily and weekly newspapers, public high school, electric lights, library, 2 National banks, and an assessed property valuation of $5,000,000. Pop. (1900) 11,918; (1910) 13,617.

Hornet (*Vespa crabro*), the largest species of wasp found in Great Britain and America. It is not uncommon in some parts of England, but is not found in Scotland. The thorax is mostly black, the fore part rufous; the abdomen is yellow, with three brown points on each segment. The sting is very painful. The hornet is a very voracious insect, seizing and devouring bees and other insects, or carrying them to its nest to feed its young. The nest is in a hollow tree, in an outhouse, or in some other sheltered place.

HORNET.

Hornet, The, a ship of the American navy in the War of 1812. She was of 18 guns rating and 480 tons burden, and was commanded by Capt. James Lawrence, afterward commander of the "Chesapeake." On Dec. 13, 1812, she blockaded the "Bonne Citoyenne" at San Salvador. On Feb. 24, 1813, she fell in with two British warships, the "Espingle" and "Peacock," and captured the latter vessel.

Hornet Moth, a name for *sphecia apiformis*. It has transparent wings, the hind margins brown, and the costæ yellowish brown; the head yellow. The larva is whitish yellow, with a blackish brown head. It feeds in the autumn and winter on the stems and roots of poplar trees. Also a term applied to the genus *Sphecia*. The lunar hornet moth is *S. bembeciformis*. The larva feeds on the wood of the sallow. In their wings and body they resemble hornets, which, however, have mandibles and a sting, both of which are wanting in hawk moths.

Horning, in Scotch law, a writing issuing at the instance of a creditor against his debtor, commanding him in the sovereign's name to pay within a certain time under pain of being declared rebel and put in prison; so termed from the fact that the officer in former times proceeded to the town cross and blew a horn before proclaiming the debtor a rebel.

Hornpipe, the name of an old wind instrument of the shawm or waits character receiving its name from the fact that the bell or open end was sometimes made of horn. In Wales, Ireland, Cornwall, and in Brittany, it was called pib-corn, *pib* or *piob* meaning pipe, and *corn*, horn. Also a dance of English origin, so called from the instrument to which it was danced. The measure or rhythm of the hornpipe is as varied as that of the tunes for country dances, and therefore all descriptions of the dance which are founded upon the supposition that there is only one form of rhythm are misleading. The hornpipe nowadays is danced by a single performer, to a tune in common time.

Horn Silver, native chloride of silver, so called because when fused it assumes a horny appearance.

Hornstone, a cryptocrystalline variety of quartz resembling flint, but more brittle, and with a more splintery fracture. In some characters it is similar to compact felspar, but differs in being infusible. Called also chert.

Hornwork, a work consisting of two half-bastions and a curtain, with two long sides called wings, which connect it with the main work, by which it is commanded. It is an extended defensible position to occupy advantageous ground or to command ground otherwise unseen.

Horology, that branch of science which treats of the principles and construction of machines for measuring and indicating portions of time. Undoubtedly the motions of the heavenly bodies form the best stand-

Horology

ard for measuring time included within lengthened periods; but for the computation of such short division as hours, minutes, and seconds, we must call to our aid certain mathematically adjusted machines, the knowledge of whose construction is regulated by the science of horology. It is almost an impossibility to state who was the individual that invented either a clock or a watch; and a great deal of the obscurity attaching to the early history of clocks is due to the fact that formerly the term horologium was applied to a sun dial or a clock indiscriminately, thereby rendering it a task of the utmost difficulty to state at what particular period it came to mean a clock. As far back as the close of the 13th or the beginning of the 14th century, striking clocks were known in Italy. In 1288, as we are told by Coke, a stone clock tower was erected opposite Westminster Hall, and in it was placed a clock, the cost of which was defrayed out of a fine of 800 marks imposed on a corrupt chief-justice of the Queen's Bench. About 1364, a German horologer, Henry de Wick, de Vick, de Wyk, or de Wyck, set up a clock in the tower of the palace of Charles V. of France. This clock was probably the basis of all the principal time keepers in use in the 16th century.

According to Berthoud, the progression of the successive improvements in horology was as follows: 1. Toothed wheelwork was known in ancient times, and particularly to Archimedes, whose instrument was provided with a motive power, but had no regulating or controlling mechanism. 2. The weight applied as a motor had, at first, a fly, most probably similar to that of a kitchen jack. 3. The ratchet wheel and click for winding up the weight, without detaching the teeth of the great wheel. 4. The regulation of the fly depending on the state of the air, it was abandoned, and a balance substituted. 5. An escapement wheel next became indispensable, as constituting, with the balance, a more regular check than the fly, on the tendency which a falling weight had to accelerate its velocity. 6. The application of a dial plate and hands to indicate the hours, was a consequence of the regularity introduced into the going part. 7. The striking portion, to proclaim at a distance, without the aid of a watcher, the hour that was indicated; and this was followed by the alarm. 8. The reduction and accommodation of all this bulky machinery to a compact and portable size, as in watches.

The date at which the size of clocks was so far reduced as to render them portable, is uncertain; it must, however, have been anterior to 1544; for in this latter year the corporation of master clockmakers at Paris procured from Francis I, a statute precluding all but master clockmakers from constructing clocks or watches, large or small. At any rate, no clock or watch could be made small enough to be portable, without having a "mainspring" substituted for a weight, as the moving power; and whenever this object was attained, then was the second great era in horology reached, as from this period may be dated the application of the fusee, and the consequent total alteration in the form and application of horological machinery.

The third era in clockwork was the application of the pendulum. Galileo was the first who remarked, or at least the first who formally announced, in his work on mechanics and motions, which was published in 1639, the isochronal property of oscillating bodies suspended by strings of the same length. In a general view, horological machines may be regarded as consisting of three essential parts: 1. A moving power, which produces a rotary motion about an axle; 2. A train of wheelwork, by means of which a velocity is obtained having any required ratio to that of the primary axle; 3. A regulator, by which the rapidity of the revolution is determined, and uniformity of motion produced. The moving power is either a heavy weight, which descends by the force of gravity, or a spring which is coiled up within a barrel and unwinds itself by the force of its elasticity; the first is preferred on account of the perfect regularity of its action when the instrument is to remain fixed in a place; the second is necessary for pocket timepieces and those which cannot be kept in a fixed postion, as on shipboard. The train of wheelwork is chiefly remarkable on account of the delicacy and accuracy of its construction. The regulator is eitner a pendulum, of which, by the theory of falling bodies, the oscillations are isochronal or performed in equal terms; or a heavy balance, the reciprocal vibrations of which are also isochronal. Of the various mechanical contrivances introduced into horological machines for accomplishing particular purposes, the most important is the escapement (or scapement), or that part of the mechanism by which the original rotatory motion is converted into a reciprocating motion, and gives impetus to the pendulum or balance. Some other parts are also of primary importance as the maintaining power, a contrivance by means of which the motion is maintained, or the machine kept going while the weight or spring is being wound up; the fusee by which in watches and spring clocks the force acting on the wheel work is rendered equal in all states of the tension of the spring.

Electrical clocks are of two kinds — electrical dials and electrical clocks. The elec-

trical dial has no body belonging to it, but is connected by means of a wire with a standard clock at some other place. An apparatus is also provided for sending a galvanic current through the wire at certain regular intervals of time. By this means the dial hands are made to leap over a small portion of their compass whenever a current is transmitted through the wire; and the time valve of the movement is marked by the figures on the dial. An electric clock, however, is one that carries with it its sources of power and is independent of any wire connected with another place.

Horoscope, in astrology, an observation of the sky and the configuration of the planets at a certain moment as at the instant of a person's birth, from which the astrologer claimed to be able to foretell the future. Also a scheme or plan of the 12 houses or 12 signs of the zodiac, in which is marked the disposition of the heavens at a particular moment, and by which astrologers pretended to be able to foretell the fortunes of persons according to the position of the stars at their birth.

Horrocks, Jeremiah, an English astronomer; born near Liverpool, apparently in 1619; entered Emmanuel College, Cambridge May 18, 1632; was appointed in 1639 to the curacy of Hoole, Lancashire, in which village he made the first observation of the transit of Venus. (Nov. 24, 1639, o. s.) He died Jan. 3, 1641.

Horse (*Equus*), an ungulate or hoofed mammal of the order *Perissodactyla*, characterized by having an odd number of toes; the family *Equidæ* formed the group *Solidungula* of old writers, owing to the presence of only a single hoof, which marks them off quite sharply from all allied animals.

The existing species of the genus *Equus* are about half a dozen in number (1) The horse (*E. caballus*) is characterized by the tail being furnished with long hairs quite from its base; by the long and flowing mane; by the possession of a bare callosity on the inner surface of the hind as well as of the fore legs; and by the head and ears being smaller and the limbs longer than in the other species. (2) The ass (*E. asinus*) is almost as widely distributed as the horse; it is probably of African origin, being almost certainly conspecific with the Abyssinian form, *E. tæniopus*. (3) The Asiatic ass (*E. hemionus*) differs from the common ass in being of a more reddish color, in the absence of the shoulder stripe, and in having smaller ears. By some zoölogists it is split up into three species — the Syrian wild ass (*E. hemippus*), the onager (*E. onager*), and the kiang or dziggetai, to which the term *E. hemionus* then becomes restricted. (4) The quagga (*E. quagga*) has dark stripes upon the head and shoulders on a brown ground; it is said to be now extinct. (5) Burchell's zebra (*E. Burchelli*) is white, with stripes on the body and the upper parts of the limbs; it extends from the Orange river to Abyssinia. (6) The mountain zebra (*E. zebra*) is white, with long black stripes reaching down to the feet. It is limited to the Cape Colony, and is rapidly disappearing. These last three are sometimes united into a special genus, *Hippotigris*. (7) The explorations of the Russian traveler Prejevalsky in 1881 added another species to the list of Asiatic forms, which has been called after him. The long hairs of the tail begin only half-way down it; the mane is short and erect, and there is no forelock; the head is large and heavy; the ears smaller than those of the ass. It inhabits the dry sultry regions of the Dzungarian desert, living in companies of 15 to 20, each led by a stallion. Only two herds were observed, and only one specimen was secured. The resemblance which this species presents to the horse of early sculptures has been pointed out by several observers. The native country of the horse seems to have been Central Asia. It became early domesticated in Egypt. In the sculptured battle scenes representing the conquests of Thothemes II. and III. over Asiatic foes, horses, some ridden by men, others drawing chariots, figure both in the Egyptian and the hostile army. It is mentioned throughout the Bible. The people of Thessaly were excellent equestrians, and probably first among the Greeks who broke them in for service in war; whence probably arose the fable that Thessaly was originally inhabited by centaurs. "Solomon had 40,000 stalls of horses for his chariots, and 12,000 horsemen," 1014 B. C. (I Kings iv: 26.) The Greeks and Romans had some covering to secure their horses' hoofs from injury. In the 9th century horses were only shod in time of frost. Shoeing was introduced into England by William I., 1066.

It was believed that the original breed of horses is extinct, and that the half-wild herds existing in many places have descended from animals once in captivity. Thus when the horse was first introduced by the Spaniards in 1537 at Buenos Ayres, it is believed that there were no wild horses in America. But individuals escaping ran wild, and by 1580 their descendants had spread over the continent as far as the Straits of Magellan. Their favorite abode is on the Pampas, where they now exist in untold numbers. In Paraguay the larva of a fly kills them. In 1764 they were introduced into the Falkland Islands by the French with a similar result. But there was found in La Plata a now extinct species

Horsemanship

of horse, and more *Equidæ* have been found in the New than in the Old World. The horse may have descended from a striped ancestor, stripes still sometimes remaining, especially in duns and mouse-duns. His present colors are brown, gray, or black, sometimes with roundish pale spots. His age is ascertained by examining first which teeth are developed, and then to what extent they have been worn away by use. They are best tamed by kindness. Like other domestic animals the horse has run into various breeds. The most celebrated is the Arab horse. The racehorse, the hunter, and the carriage horse all vary considerably in character.

Horsemanship, the act or art of riding; the practice of training and managing horses; equestrianism. The natural paces of the horse, in their proper order, are the walk, the trot, the gallop, the canter; and perhaps leaping. The walk, when slow, is the simplest of all paces. In order to render the walk agreeable to the rider, it should be true; that is, it should be conducted by a harmonious and symmetrical elevation and depression or setting down of the feet. To walk fast requires great liberty in the angles of the limbs, but particularly so in the elevation of the fore-parts, and obliquity of the shoulders; a corresponding length and angularity in the hind legs is also requisite for the perfection of the pace. Whether the walk is quick or slow, each foot should be dropped flat on the ground, and not, as is too often the case, the toe placed first, and then the heel. The breaking of a horse will have much influence on his method of walking; the angles of his limbs will have much more; and not a little will depend on the hand of the rider. One horseman by seat and hand will force the horse to carry his head in the right place, and to elevate and extend his limbs, the one in unison with the other; and another rider, by his bad seat and coarse hand, will bring his horse to stop short and irregularly, and thus so mix the trot with the walk as to do little more than shuffle over the ground. The maximum of speed in the true walk of a horse is 6 miles an hour, though 5 miles per hour is a good rate of speed for a fast walker.

The trot is the next pace after the walk, and it is always performed diagonally, the limbs being differently employed, according to the rate of progression, whether fast or slow. There are three varieties of the trot; namely, the moderate, the extended, and the running trot. In the moderate, or slow trot, the diagonal legs (as the off fore- and near hind-legs) are elevated, and replaced on the ground together; while the two other legs remain on the ground to support the weight of the horse and his rider. The gallop may be properly divided into three varieties, all effected, however, by a propulsive effort of the hind-quarters. Of gallops there are — the racing, or gallop at full speed; the slow, or hand-gallop; and the canter; which latter is really but a slow gallop. The first of these varieties, or the racing gallop, is nothing more than a succession of leaps. It cannot be commenced without the intervention of the slower gallop, in which one of the hinder legs is first advanced to establish a new center, for it would require too great an effort to raise the fore parts at once from a state of rest by means of the loins, and to throw them forward at the first action to a considerable distance by means of the haunches and thighs.

The hand-gallop is a pace between the amble and the racing gallop, and differs from both, from the fact of its not being performed diagonally, and from the limbs not being thrown out and contracted equally, one generally taking the lead, as it were, of the other, and being pushed further forward, while the other is more curved. The canter differs from the gallop in consequence of the movements of the legs, instead of being simultaneous, being directly the reverse. At no period of time is the animal wholly in the air, one of his legs being always touching the ground; and this it is that gives the pace its peculiar effect. In order to insure the safety of progression of the horse, the Parthians used to place pieces of chalk and stones in the paths of their young horses, so as to accustom them to look to their steps, and to elevate their feet sufficiently; while the Romans tied clogs to the pasterns of their colts for a similar purpose.

Mounting is the first step in horsemanship; and a certain precaution is necessary in this, as in everything pertaining to horses. The person must approach the animal by walking up to him on the left side, not directly in front, as this might alarm him and make him strike out. The rider is recommended by old writers on the subject to take the reins and the pommel of the saddle in his left hand, after having placed his left foot firmly in the stirrup, and by laying his right hand fast on the hinder part of the saddle, to vault into his seat. When mounted, the first thing to set about is the proper adjustment of the reins. If the horse is to be ridden with a single-bridle rein, the reins must be drawn with the rider's right hand through his left, till the horse's mouth has been placed equally on both sides, and then the left hand must be shut, allowing the little finger to separate the two reins. With a double-rein bridle the same must be done. The bridle-reins should be held at a convenient length; for, if short, they will discompose the attitude

of the body, by pulling the left shoulder forward; and they should be held with a firm grasp, dividing them, as before mentioned, with the little finger. When a horse pulls at his rider, he should advance his arm a little, but not the shoulder, toward the horse's head, raising his hand toward his breast, and the lower part of the palm rather than the upper; but he should not shorten the rein in his hand if he can command his horse without it, or he may lose the proper appui, or bearing of his mouth. Old writers recommend the bridle-hand to be held perpendicularly, the thumb being uppermost and placed on the bridle. Modern practice is in favor of the knuckles being uppermost. The perpendicular hand may do very well in the school, or with the severe bit of the highly-drilled dragoon-horse; but no man could ride a free-going race-horse over a course, or a hasty hunter over a country in that form.

The seat must be the next consideration of the learner. A great improvement has been made in this respect, by substituting the long stirrup-leathers for the shorter ones which were formerly in vogue. With short stirrup-leathers the rider's seat is thrown back in the saddle, instead of keeping the central equipoise, and, consequently, his weight is thrown on the horse's loins, the weakest part in the body of the animal. The thighs are the most essential parts of a horseman, in giving him a good, firm seat, and on their form will depend the position of the knees, also important to the acquisition of a firm seat. The thighs should touch the saddle and the sides of the horse with their inner surface chiefly, and the knees and toes should not protrude too much. The toes should be turned a little outward and upward; for the toes being turned in, necessarily cramps the knees, and prevents the animal from exerting his strength. The manner in which the foot is placed in the stirrup varies considerably with different riders. The soldier always, the rider for pleasure or on the road generally, rests on the ball of the foot, with a gentle play of the instep; but the man who rides after hounds, and the jockey when he rides a race, find it necessary to have the foot more home in the stirrup, with the toes turned a little upward, as well as a little outward. The advantages of all this are twofold. First, it gives them more power over their horses, by furnishing them with a more substantial fulcrum; and, secondly, to the man following hounds, it is a great security against the foot being chucked out of the stirrup, by the seat being disturbed in a leap, or from any of those causes which perpetually occur in crossing a country. As an easy seat is most important to persons who are obliged, whether by necessity or pleasure, to ride many hours in succession on the road, the following rules should be carefully observed, in order to obtain the same: The rider should, in the first place, sit well down in the middle of the saddle, with just that length of stirrup-leather as will admit of the fork clearing the pommel of the saddle. The body of the rider should also incline forward in the trot, as he thus furnishes a proper counter-balance to the movements of the horse; and, above all things, a steady seat must be maintained, as, unless such is the case, the latter will be incommoded in his pace and distressed beyond measure.

Horse, Master of the, the third great officer of the English court, who has the superintendence of the royal stables, and of all horses and breeds of horses belonging to the king. He exercises authority over all the equerries and pages, grooms, coachmen, saddlers, and farriers, and has the appointment and control of all artificers working for the royal stables. He is answerable for the disbursement of all revenues appropriated to defray the expenses of his department; but his accounts are audited and examined by the Board of Green Cloth. He has the privilege of making use of the royal horses, pages, and servants, and rides next to the monarch on all state occasions. The office is one of great antiquity, and is considered a position of great honor. He is appointed during pleasure, by letters-patent; but his tenure of office depends on the existence of the political party in power. The salary is $12,500 a year.

Horse Chestnut, a handsome genus of trees or shrubs (*Æsculus*) belonging to the natural order *Sapindaceæ*, having large opposite digitate leaves, and terminal panicles of showy white, yellow, or red flowers. *Æ. Hippocastanum* (the common horse chestnut) is familiar to everyone. The seeds are large and farinaceous, and have been used as food for animals; they are bitter, and the bark also is bitter, astringent, and febrifugal. The tree is said to have been brought from Constantinople to England in the beginning of the 16th century, and is supposed to be a native of Northern Asia. Three other species are found in North America, where they are popularly known under the name of buckeye.

Horse Guards, in England, the name given to the headquarters of the British army. It is situated in London, and takes its title from two mounted troopers of the "Royal Horse Guards," who are posted as sentries at the entrance. It forms a distinct establishment from that of the War Office, the latter monopolizing the financial or legislative department of military af-

fairs under the control of the Secretary of War, while the Horse Guards has the executive charge under the orders of the commander-in-chief.

Horse Latitudes, a phrase by which sailors designate a region in the North Atlantic bounded by the parallels of lat. 30° and 35° N., much subject to baffling calms and light airs. The name arose, so runs the legend, from the fact that ships formerly sailing from New England to the West Indies, freighted with a load of horses, were from their detention in this vicinity, and the consequent exhaustion of their supply of fresh water, compelled to heave the live stock overboard.

Horse Mackerel. See SCAD.

Horse Marines, one of a mythical body of troops, the name of which is often used to play a joke on the innocent; an awkward, lubberly person; one who is out of his place, as a horse soldier in a sea fight. As a matter of fact of late years marines have been occasionally mounted in Mexico, Egypt, and elsewhere.

Horse Power, the measure of a steam engine's power, as originally settled by James Watt, being a lifting power equal to 33,000 pounds raised one foot high per minute. Thus an engine is said to be of 100 horse power (h. p.) when it has a lifting capacity equivalent to 3,300,000 pounds one foot high per minute. To ascertain the horse power of an engine multiply together the pressure in pounds on a square inch of the piston, the area of the piston in inches, the length of the stroke in feet, and the number of strokes per minute, divide the result by 33,000, and the quotient, less one-tenth, allowed for loss by friction, will give the horse power. Engines are frequently said to be of so many horse power nominal; the real or indicated horse power, however, often exceeds the nominal by as much as three to one.

Horseradish, in botany, *Cochlearia armoracia.* Sir Joseph Hooker places it under a sub-genus of *Cochlearia* called *Armoracia,* which has valves with no dorsal nerve. It is found as an alien, or a denizen, in ditches, corners of fields, etc. It is acrid and stimulating. It contains a volatile oil, albyl sulphocyanate, $C_3H_5 \cdot CNS$. It is used in pharmacy in the preparation of compound spirit of horseradish. It is used in atonic dyspepsia, also as a sudorific in chronic rheumatism, and is a diuretic in dropsies. Horseradish is used in a fresh state as a condiment with roast beef, and is an important element in at least one well-known sauce.

Horseshoe Crabs, a name for the crustaceous genus *Limulus,* more commonly called king crabs. The resemblance to a horseshoe is in the buckler which covers the anterior part of the body. The name horseshoe crab is used chiefly of the molucca, or common king crab.

Horseshoeing, the art of fitting the equine hoof with a protective rim. In olden times horses generally went unshod, as they now do in many eastern countries; but our macadamized roads and paved streets, fast paces and heavy loads, would speedily wear away the stoutest hoofs, and a rim of iron has accordingly been long in use as a protection. In style and pattern the horse's shoe varies almost as much as his master's boot, and like it, when badly made or unskillfully fitted, produces serious inconvenience, and even leads to accidents and diseases. When the feet are strong and properly managed nothing is better than a plain shoe of tolerably uniform breadth and thickness, carefully fashioned to the shape of the foot. But many good authorities prefer what is called a seated shoe, which has a level part for the crust to rest upon, and within that the inner half of the shoe toward the sole surface is bevelled off. This seated shoe is thus wider than the plain shoe, and hence affords greater protection for a weak or flat sole.

For faulty or diseased feet special forms of shoes are made. In all healthy feet the shoe should be fitted to the foot, and not, as is commonly done, the foot cut to fit the shoe. Another frequent error must be avoided — keeping the shoe short and spare at the heels. For roadsters the toe of the fore-shoes should be slightly turned up, which greatly obviates tripping. The hind-shoes are generally thickened and sometimes turned down at the heels. The number of nails required must vary somewhat with the weight of the shoe and the soundness of the horn; five is the minimum, nine the maximum. It is important, however, that the shoes be firmly held on by as few nails as possible. In a saddle-horse with sound feet three on the outside and two on the inside should suffice to hold a well-fitted shoe.

To preserve the foot in a sound state the shoes should be removed every month. When the shoe is carefully taken off, the wall-surface on which it has rested should be rasped, to remove any ragged edges and any portions of adhering nails. Having for a month been protected from the wear to which the exposed portions of the foot are subjected, it will probably have grown considerably, and in a stout hoof will require to be cut down with the drawing-knife, especially toward the toe. Except in very strong feet and in farm-horses working on soft land, the surface of the sole uncovered by the shoe seldom requires to be cut. It is the natural protection of the internal

delicate parts, and must be preferable to the leather and pads often artificially substituted for it. The bars must likewise remain untouched, for they are of great service in supporting weight; while the tough, elastic frog must be scrupulously preserved from the destructive attacks of the knife, and allowed uninjured to fulfil its functions as an insensible pad, obviating concussion and supporting weight.

When the shoe is put on and the nails well driven home, they should be broken off about an eighth or even a sixteenth of an inch from the crust, and hammered well down into it. This obviously gives the shoe a much firmer hold than the usual practice of twisting off the projecting nail close to the crust, and afterward rasping down any asperities that still remain. When the shoe is firmly clinched the rasp may be very lightly run round the lower margin of the crust just where it meets the shoe, to smooth down any irregularities; but all further use of the rasp must be interdicted. The clinched nails if touched will only have their firm hold weakened; nor must the upper portions of the crust, which blacksmiths are so fond of turning out rasped and whitened, be thus senselessly deprived of those external unctuous secretions which render the unrasped foot so tough and sound and so free from sandcracks. The hoof cannot be too dry and tough. From time to time various attempts have been made to fix shoes to horses' feet without nails; and a shoe has been invented, which is said to have answered the purpose; but in the opinion of many the system is still immature, and requires to be more extensively tested.

Horsetail, among the Turks and other Eastern nations, the tail of a horse mounted on a lance, and used as a standard of rank and honor. The three grades of pashas are distinguished by the number of tails borne on their standards, three being allotted to the highest dignitaries or viziers, two to the governors of the more important provinces, and one to those of less important districts.

Horsetail. See EQUISETUM.

Horsford, Eben Norton, an American chemist; born in Moscow, N. Y., July 27, 1818; received an academic education; was for some time principal of the Albany Female Academy; later studied chemistry in Germany under Baron Liebig; was Rumford Professor at Harvard College from 1847 to 1863; was one of the founders of Lawrence Scientific School; and was interested in proprietary articles. He died in Cambridge, Mass., Jan. 1, 1893.

Horsley, Samuel, an English bishop; born in 1733. He was appointed in 1788 Bishop of St. David's, from which he was translated to Rochester in 1793, receiving at the same time the deanery of Westminster; and finally to St. Asaph in 1802, when he resigned his deanery. Horsley was the greatest theological controversialist of his day, and is famous for his controversy with Priestley on Unitarianism. He died in 1806.

Hortense, Eugénie de Beauharnais, (hōr-tens'), daughter of Josephine, the consort of Napoleon I., and of the Vicomte de Beauharnais, her first husband; born in Paris in 1783. She was married to Louis Bonaparte, the brother of Napoleon, in 1802. The match had been desired by the consul for political reasons, and it proved a most unhappy one. In 1806, Hortense became queen-consort of Holland, and about a year afterward was separated from her husband after giving birth to three sons: (1) Napoleon Charles, who died in infancy, and whose intended adoption by Napoleon was refused by Louis. (2) Napoleon Louis, who was baptized by the Pope Pius VII., and instead of attaining the high destiny proposed for him, was killed in an insurrection at Romagna, 1832; and (3) Louis Napoleon, the last emperor of the French. On the divorce of her mother, Josephine, Queen Hortense joined her in her retirement of Malmaison, and after her death, in 1814, so soon followed by the fall of Napoleon, became an unprotected and calumniated wanderer, till her residence was fixed at Augsburg by the King of Bavaria. She died Oct. 5, 1837.

Hortensia (hōr-ten'sē-ä), the daughter of the orator Hortensius, who inherited her father's eloquence, and pleaded in behalf of the ladies of Rome before the triumvirs, in 43 B. C.

Hortensius, Quintus (hōr-tēn'sē-us), a celebrated Roman orator; born in 114 B. C., till his great rival Cicero, bore away the palm, he eclipsed all others in the grace and splendor of his eloquence. He was elegant in his style, and acute in the conception and distribution of his matter. He held many civil and military offices; was made consul 69 B. C.; was Cicero's colleague as augur; and died immensely rich in 50 B. C.

Horticultural Societies, societies formed for the encouragement of both the art and the science of the cultivation of garden plants. Horticultural societies have been instituted in all the principal American cities, and an earnest spirit manifested.

Horticulture (from *hortus*, garden, and *colere*, to till) includes, in its most extensive signification, the cultivation of esculent vegetables, fruits, and ornamental plants. The practice of horticulture, especially as applied to the cultivation of

ornamental plants, is as old as the oldest civilization of which anything is known. The bards, scholars, and philosophers of the classic ages have transmitted descriptions of the gardens of the ancients, from those in which Homer places the palace of Alcinous and the cottage of Laertes, to the splendid villas of Pliny and Lucullus. Among the Ancient Greek writers, Hesiod, Theophrastus, Xenophon, and Ælian treated of gardens to a certain extent; and works of those who wrote after the seat of government was removed to Constantinople were collected under the title "Geoponica," and have been translated by Owen. Among the Latins, Varro was the first author to whom succeeded Cato, Pliny the Elder, Columella, and Palladius. Passages are to be found relative to the subject in Martial, Vergil, and Horace; but Pliny's "Natural History," and Columella's "Book on Gardens," contain the most correct information on Roman horticulture. For several centuries after the overthrow of the Roman empire in the West by the Northern barbarians horticulture was almost confined in Christian Europe to the lands under control of the monasteries.

Among the Arabs in Spain there is no doubt that great attention was paid to the art, and that numerous flourishing gardens were to be seen in the empire of Cordova, as afterward in that of Granada. In another part of Europe a temporary impulse was given to the formation of gardens by a capitulary of Charlemagne requiring gardens to be made throughout his whole dominion, and even mentioning the flowers which were to be cultivated in them. Walafried Strabo, who wrote shortly after the time of Charlemagne, is the author of a Latin poem which gives an account of the gardening of the time.

The practice of horticulture does not appear to have been again revived outside of the monasteries in Christian Europe till the 10th century, when it began to be fostered in Italy by Alfonso d'Este, who is recorded to have founded several botanical gardens, and whose example was followed in Pisa, Ferrara, Venice, Padua, and elsewhere. In the same century the earliest botanical gardens were established in France, Germany, and Holland. Among the earliest in France were those founded at Le Mans by Belon, on his return from his travels, about the middle of the 16th century, and by Henry IV. at Montpellier at a later date. The first established in Germany were those at Breslau, Basel, and Strassburg, and the oldest in Holland is that of Leyden. At first the plants to be seen in such botanic gardens could only be native plants, or such as flourished in a climate corresponding to that of the country where the garden in which they were grown was situated. The re-invention of

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greenhouses (which were known to the Romans) was of great importance to horticulture, as enabling botanists to preserve exotic plants in gardens the climate of which was naturally unsuited for them. The credit of this re-invention is ascribed to Solomon de Caus, who was gardener to the elector palatine at the beginning of the 17th century; but it was not till a century later (1717) that use of glass roofs for greenhouses was suggested, which had the effect of increasing still further the range of plants which could be cultivated in European gardens; for the first greenhouses used in modern times having opaque roofs could only be used for the preservation during the winter of such flowers as could bear a European spring and summer but were killed by severe cold, while in greenhouses with glass roofs exotic plants could be kept permanently at the temperature suited to them. Another important improvement in the construction of greenhouses is the substitution of curved glass roofs in iron frames, which admit a much greater amount of light than the straight roofs.

In the present state of horticulture England is in some respects ahead of nearly all other countries. Nowhere is the taste for gardening more general. The eye is continually struck with cottages embowered amidst fruit trees, shrubs, and flowers, while a neat compartment of esculent vegetables supplies much of the food for the inmates. Much also has been done for the promotion of horticulture as a science. The London Horticultural Society, instituted in consequence of the efforts of Knight, Wedgwood, and Sir Joseph Banks in 1804, was the first of the kind ever set on foot, and similar institutions are now very numerous in Great Britain. England can also boast of having been the first to possess an experimental garden, the one now located at Chiswick, where it was removed in 1822, having been founded in 1817. The gardens at Kew, near London, contain a collection of exotic plants which is unrivaled in any other country. For devotion to horticulture Belgium stands next to England if not even above it. Ghent may be described as the floral capital of that country. There every one is a horticulturist either from taste or by profession. It was in this town that in 1809 the idea of holding annual flower-shows, which has been adopted elsewhere, and has been of great benefit to the art of horticulture, originated. The Belgian florists are especially remarkable for the extreme care which they bestow on the practical part of the art. The utmost attention is paid to order and cleanliness. Everything which can poison the atmosphere or offend the eye is scrupulously removed. The glass of the hot houses is constantly being cleaned, and the walls

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brushed, and the utmost industry is employed in ridding the plants of destructive insects and noxious parasites. Holland also has long been distinguished for her excellence in gardening both as applied to fruits and flowers. Some of the finest fruits of our gardens were produced by the indefatigable experimentalists of that country.

In France the taste for gardening is not so general as it is in the countries just mentioned, but if the state of horticulture in Paris were taken as representative of its condition throughout the rest of the country, she would hold a high rank. A horticultural society was established in Paris in 1826, and has now a very large membership. In the various provinces where horticultural societies have not been founded, those of agriculture or of the sciences and arts have departments expressly devoted to that interesting pursuit; and in 1827 a practical and theoretical institution was founded at Fromont by the Chevalier Soulange Bodin, for educating gardeners and introducing improvements in every department of horticulture. The nursery of the Luxembourg at Paris long supplied a great part of Europe with fruit trees; and the flower garden of St. Cloud, and that of Trianon, also became famous. The Jardin des Plantes (Paris) is the principal botanical garden in France, and is unquestionably one of the most scientific and best managed establishments in Europe. In Germany the chief botanical gardens are those of Munich and Berlin, and in Austria that of Vienna. That of Berlin is especially famous. The art of gardening in Russia, in common with other useful pursuits, owes its origin to Peter the Great. Previous to the reign of that monarch there was scarcely such a thing known throughout the empire as a garden, and the only culinary vegetables grown in the country were a few specimens of stunted kale. Horticulture has now attained a high degree of excellence in that country under the auspices of its princes and nobles; and it is a curious fact that more pineapples are grown in the immediate vicinity of St. Petersburg than in all other countries of continental Europe. In Poland gardening was practised earlier than in Russia. In Warsaw there is a very remarkable garden, laid out by King Augustus II. (Elector of Saxony) in 1721, and hence called the Saxon garden. It is to Spain that the rest of Europe is indebted for the introduction of many plants from Mexico, Chile, and Peru. Seeds were brought from these regions in the reign of Ferdinand VI. for the royal garden of Madrid, whence their produce has been distributed. The oldest and most extensive gardens now to be found in Spain are of Moorish origin, and were once appendages to the palaces of the Arabian kings. The floating gardens or *chinampas* of Mexico, and the similar gardens in some parts of China, are gardens of a peculiar character.

After this historical and geographical sketch on the subject of horticulture, it remains to add something on the practice of the art. The practical objects of the cultivator of vegetable substances are:

(1) To collect useful and ornamental plants from the domains of nature, and from all quarters of the world.

(2) To adapt the soil, moisture, heat, and general culture suitable to such plants, so that they may vegetate to the full extent of their powers.

(3) By artificial means, such as blanching and other processes, to change the nature and juices of plants, whereby they are rendered more esculent.

(4) To produce new sorts or varieties of natural species by engrafting, budding, and other processes.

On the first of these heads it is necessary to say nothing. The soil which covers the surface of the earth is composed of various inorganic matters with a greater or less proportion of vegetable remains. Some soils, indeed, are almost entirely composed of vegetable remains, and constitute the rich dark mold which is esteemed the most fertile for the growth of vegetables. Some plants, however, thrive best in one kind of soil, and some in another. The object of the horticulturist is to adapt his soil for the particular kinds of plants he wishes to rear in perfection. Hence the preparation of artificial soils. It is doubted by many whether the pure earths afford any nourishment to plants; at all events they enter but very sparingly into their composition. They serve, however, as a medium by which water, carbon, and some of the gases are conveyed into their juices, and also as a convenient means by which the fibrous or bulbous roots are attached to and held firm and stationary in the ground. The true nourishment of plants is water and decomposing organic matter, whether vegetable or animal. The constituent parts of the soil which give tenacity and coherence, are the minutely divided particles, and they possess this power in the greatest degree if they be aluminous.

If the siliceous or sandy particles are in excess, however, sterility is the consequence. Neither must the soil be too much comminuted; a certain proportion of coarser particles seems to be requisite. No one ingredient should be in excess in any fertile soil, not even an excess of organic matters, so that the best soil for general purposes is that where an equable admixture of the general ingredients is present, with a portion of the particles in a state of minute comminution.

Much of the fertility of soils depends on their power of absorbing moisture from

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the air. When this power is great the plant is supplied with moisture in dry seasons, and the effects of evaporation during the sunshine is compensated by the absorption of moisture at night. Stiff clayey soils which absorb a great proportion of rain water are not, however, the best suited for absorbing it in dry weather, as the surface becomes hard and separates into deep fissures, which assist the evaporating effects from the interior. The best absorbing soils are those in which there is a due admixture of sand, clay, and lime, with animal or vegetable matter, and of a loose and light texture, freely permeable to the air and moisture. Carbonate of lime and animal and vegetable matter are highly useful in this respect to soils; they impart an absorbent power without giving the soil too great tenacity. The absorbent power of soils ought to be adapted to the climate. In moist climates a sandy light soil will be more productive than a deep clayey one, and the contrary. The subsoil also has a considerable effect in modifying the quantity of moisture. Shallow soils, situated on rocky ground, soon lose their moisture, while deep clay subsoils retain it for a long time. Some soils absorb heat much more quickly and copiously than others, and also retain their heat longer. Black and brown mold has this property, while lighter clays and chalky soils are less absorbent of heat, the former giving it out again sooner than the latter. Marshy soils, exposed to inundations and to continual evaporation, are colder and more ungenial than dry lands. The elevation above the sea-level has also a very great effect on the temperature and on the growth of plants. Digging, plowing, and pulverizing the soil, and exposing the surface to the action of the summer sun and the winter's frost, are highly useful operations, by which the tenacity of stiff soils is overcome, the weeds and insects are destroyed and a quantity of air is admitted into its particles.

Nutritive matter is often supplied to plants in the form of manure. Manures are either organic or inorganic, the former including vegetable and animal manures. The principal vegetable manures include all green succulent plants which contain saccharine and mucilaginous matter, rape and linseed cake, malt dust, sea weeds, peat earth (which requires, however, an admixture of dung), tanner's spent bark (also requiring dung), etc. Animal manures in general require no chemical preparation to fit them for the soil. The chief thing to look to in employing them is to blend them with the earthy constituents in a proper state of division, and to prevent their too rapid decomposition. The chief are fish, bones, hair, urine, blood, and dung. Perhaps the most valuable of such manures is guano, which, as is well known, consists of the dung of certain birds. The chief inorganic manures are lime, gypsum, common salt, and soot.

After the soil is properly dry and pulverized the seeds are deposited, and this should always be done in dry weather, for a dry soil is especially requisite for covering in the seeds. Small seeds are sown in greater or less quantity, according to the kind. Some are planted singly, as beans, potatoes; and the depth at which they are covered in depends much upon the kinds of plants. Some seeds require a mere sprinkling of earth, others have to be covered up with one, two, or three inches of mold, especially if planted at times when frost occurs. In general, however, as germination requires air and heat, the seeds should not be more than covered with the soil.

Watering is often necessary as a means of nourishment to growing plants, especially as a support to newly transplanted vegetables, and for cleaning the leaves and destroying insects. Water should never be thrown over the leaves of plants when the sun shines. Indeed, watering should always be practised either in the evening or the morning, as during sunny days the sudden evaporation of water causes a chill which is fatal to vegetation.

For an account of the processes of budding and grafting see these articles. Another mode of propagation is that by means of cuttings. This process is exceedingly simple and easy in the case of many trees, as the willows and poplars; but requires some management in the heaths, myrtles, and other shrubs. Cuttings are to be chosen from the side shoots of plants, especially those which show a tendency to droop toward the ground, and the proper time for doing this is when the sap is in full motion. The cuttings should contain a portion of last year's wood, or of wood so far formed, and after it has assumed its proper brown color. Cuttings from the herbaceous plants are chiefly taken from the low growths, but they will also succeed occasionally from the flower stems. The cuttings should be prepared so that the lower end terminates in a joint or bud where the leaves spring out, and the upper leaves should be left on the branch. In plants difficult to strike, it is a general practise before cutting them off from the parent plant, to cut a ring round the bark, and after remaining on the parent branch for a short time, till a callus is formed, they are cut off below the ring and inserted into earth.

Tender cuttings to be planted in pots should be placed near the sides, not in the middle, with their lower ends touching the bottom of the pot, or resting in sand or gravel. In this way they readily strike, whereas, if planted in the loam in the mid-

dle, they will fail. The cuttings should not be inserted to a great depth, and a moderate degree of heat, moisture, and light is preferable to any excess. A glass frame or hand bell cover promotes their striking very considerably, by tending to promote an equilibrium of atmosphere and temperature. The degree of heat necessary depends upon the nature of the plants. In general, cuttings during the process of striking require less heat than the vigorous parent plant. Cuttings of deciduous hardy trees taken off in autumn should be kept dormant like the parent trees.

Hortus Siccus. See HERBARIUM.

Horus (hō′rus), an Egyptian deity, whose name, "Har," means "the day," or "the sun's path," and is generally written in hieroglyphics by the sparrow hawk, which was sacred to him. Under the name of Horus were included several deities, as Harly resembles that of the Apollo of the Greeks.

Horvath, Michael (hōr′vät), a Hungarian historian; born in Szentes, Oct. 20, 1809. In 1844 he became Professor of the Hungarian Language and Literature in Vienna, and four years later Bishop of Csanad. He took an active part in the revolutionary war, holding the appointment of minister of "culture" and public instruction. The defeat of the Hungarians drove him into exile. In his absence he was condemned to death, but was allowed to return home under the amnesty of 1867. Of several historical works which he wrote three deserve special mention: "History of Hungary to 1823," and its continuations, "Twenty-five Years of Hungarian History, 1823–1848," and "History of the War of Independence in Hungary." He died in 1878.

Hosack, David, an American physician; born in New York city, Aug. 31, 1769; was

TRIUMPH OF HORUS.

oerts, the elder Horus, and Harpocrates, or the younger Horus; Har-sam-ta, Horus, the uniter of the upper and lower world, who was the second son of Athor, resided in Annu, Heliopolis, and emanated from the eye of the sun; and Har-net-ta, another form of the same god, represented as a boy wearing a triple crown, who existed from the commencement of things, a self-created being, and emanated from the Nu, or firmament, besides several others. But the principal Horus was Horus, the son of Isis (Har-si-hesi), represented as a naked child standing wearing a skullcap, or the crown of Upper and Lower Egypt. When he reached manhood, he attacked his enemy Typhon, the god of darkness, and avenged on him the death of his father. He afterward traveled through Egypt, introducing everywhere civilization and the arts. His career great-

graduated at Princeton College, in 1789; became Professor of Surgery in the College of Physicians and Surgeons; made a special study of yellow fever; and published "System of Practical Nosology"; "Lectures on the Theory and Practice of Medicine"; etc. He died in New York city, Dec. 22, 1835.

Hosanna (hō-zan′ä), a form of Jewish acclamatory prayer or blessing, derived originally from Ps. cxviii: 25. It was often uttered at the Feast of Tabernacles, when the 25th and 26th verses of Psalm cxviii. were repeated. It therefore came to be used for the branches of myrtle, etc., or for the great palm leaves, carried about at the festival, or even for the festival itself. It spread next to the Passover and some other feasts. Also the acclamation raised by "the whole multitude of the disciples" (Luke xix: 37) on our Lord's triumphal entry into

Jerusalem. They seem to have intended by it to offer to Jesus a prayer that they might be saved, and to accord Him a joyous and loving welcome to Jerusalem (Matt. xxi: 9; Mark xi: 9, 10; John xii: 13). It is now employed as an acclamation of praise.

Hosea (hō-zē-ä), the first of the 12 minor prophets as arranged in the Bible. He prophesied for a long time from Uzziah to Hezekiah, about 785–725 B. C. The "Book of Hosea" contains properly two parts. The first three chapters contain a series of symbolical actions directed against the idolatries of Israel. The remaining chapters are chiefly occupied with denunciation against Israel, and especially Samaria, for the worship of idols which prevailed there. Hosea's warnings are mingled with tender and pathetic expostulations. His style is obscure, and it is difficult to fix the periods or the divisions of his various predictions. He shows a joyful faith in the coming Redeemer, and is several times quoted in the New Testament (Matt. ix: 13; Rom. ix: 25, 26; I Pet. ii: 10).

Hoshiarpur (hōsh'yar-pör), capital of a district in Punjab, India, near the foot of the Siwalik Hills, 90 miles E. from Lahore. It is a seat of an American Presbyterian Mission.

Hosiery, a general term for all kinds of knitted articles, including drawers, petticoats, night-dresses, etc., and fancy articles such as head-dresses, hoods, shawls, neckerchiefs, watch-guards, cravats, etc. The materials used for the purpose are cotton, linen, and wool, the last of which is sometimes mixed with cotton or silk. Silk is also frequently used alone. Nearly all articles of hosiery, except some fancy articles, are now made by a knitting-frame of some kind or other.

Hosmer, Harriet, an American sculptor; born in Watertown, Mass., Oct. 9, 1830; studied at Rome; best-known works are "Ideal Heads of Daphne and Medusa," "Puck," "The Sleeping Faun," "Waking Faun," "Beatrice Cenci"; statues of Thomas H. Benton, Queen Isabella, and the Queen of Naples; and a number of ornamental fountains. She died Feb. 21, 1908.

Hosmer, James Kendall, an American librarian; born in Northfield, Mass., Jan. 29, 1834; was professor in Antioch College 1866–1872; the University of Missouri, Columbia, Mo., 1872; Washington University, St. Louis, Mo., 1874–1892; and became librarian of the public library of Minneapolis in 1892. Among his works are: "The Color Guard" (1864), a record of experiences in the Civil War; "The Thinking Bayonet" (1865), a novel; "History of German Literature" (1879); "Life of Samuel Adams" (1885); "How Thankful was Bewitched"; "Life of Sir Henry Vane"; "Story of the Jews," in "Story of the Nations" series; etc.

Hosmer, Mrs. Margaret (Kerr), an American novelist; born in Philadelphia Dec. 1, 1830. Her home was in San Francisco, where she taught school, and in Philadelphia. She wrote the novels, "The Morrisons" (1864), "Rich and Poor" (1870), "The Sin of the Father" (1872), etc.; the juveniles, "Blanche Gilroy" (1871), "A Rough Boy's Story" (1873); and also, "Ten Years of a Lifetime." She died in Philadelphia, Feb. 1, 1897.

Hosmer, William Henry Cuyler, an American author; born in Avon, N. Y., May 25, 1814. He wrote: "Fall of Tecumseh"; "Legends of the Senecas"; "Yonnondio"; "Bird Notes"; "The Themes of Song"; "The Months"; "The Pioneers of Western New York"; etc. He died in Avon, May 23, 1877.

Hospice (hos'pis), a little convent belonging to a religious order, occupied by a few monks, and destined to receive and entertain traveling monks; or houses of refuge and entertainment for travelers on some difficult road or pass, as the Hospice of the Great St. Bernard.

Hospital, any building for the reception and treatment of sick, injured or infirm persons. They are supported in most cases by voluntary contributions, but in special instances from the funds of the government, State or civic municipalities. Hospitals are of various kinds: medical; surgical; for the reception of incurables; for consumptives; for the deaf, dumb and blind; for the aged and infirm; for the care and treatment of the insane; emergency and field hospitals for the care of wounded in battle; etc. Modern hospitals are so constructed and their interior is so arranged, as to enable a limited staff of physicians and nurses to attend to the wants of the greatest possible number of patients with a view to the most speedy recovery. The desiderata to obtain these ends are: (1) Pure and uncontaminated air, so that there shall be no appreciable difference in purity between the air of the wards and the external atmosphere. (2) The atmospheric supply must be so arranged as to allow its heating to any desired degree of temperature. (3) Pure and abundant water supply for internal uses and to insure the removal of all impurities. (4) The most exacting and thorough cleanliness.

The site selected for a hospital should be on high ground; the soil should be clean and dry, free from damp ravines and undrained marshy ground, and the drainage should be ample. If possible it should not be surrounded by other buildings than

those belonging to the hospital itself. The structural arrangements should be such as to secure perfect, free circulation and sunshine. The size of the wards depends on the number of patients to be therein maintained and having a capacity of 3,000 cubic feet for each inmate. The disciplinary and economical disposition in a hospital requires that each nurse should have the patients allotted to her under constant observation and personal supervision and that the arrangements are so constructed that the greatest number of patients can be attended and nursed by a given number of nurses. From 20 to 32 beds have been taken as a basis for ward construction. In some hospitals there are wards of one and two beds for cases of unusual gravity. The general form of ward construction is governed by the question of renewal of air and the superficial area allowed to each patient, for on this depends the distance of the sick from each other, the facility of changing the beds, cleanliness and many other important features. In a ward 24 feet wide, with a window for every bed or two, a 7 foot 6 inch bed space along the outer walls is sufficient. That would give 90 superficial feet per bed, which must however be increased in pernicious fevers, surgery and lying-in cases. In the Herbert Hospital the smallest allowance is 99 feet per bed. The ceilings should be 12 to 14 feet high. With a view to economize heat in winter and to keep the wards cool in summer the walls should be hollow and all walls ceiled. The walls should be of an impervious polished surface, easily cleansed with soap and water. All corners should be rounded off and no cracks are to be tolerated, since they fill with impurities. Plaster, wood, paint and varnish all absorb organic impurities. The safest arrangement for walls is plaster, lime-whited or painted, which should often be scraped off or renewed.

The floors and woodwork throughout should be of oak, closely jointed, oiled and waxed, rubbed and polished. Confine the woodwork to absolute necessity. The forms of windows must be adapted to facilitate the entrance of light, as a factor to promote health, to promote ventilation, to facilitate nursing and allow the patient to read in bed. In order to give cheerfulness to the ward and to renew the air easily, the windows should be inserted opposite each other; should extend to 2 feet 6 inches from the floor to within a foot of the ceiling. One cubic foot of window glass to every 50 or 55 cubic feet of space will afford a well lighted, cheerful ward.

The ward offices are those necessary for facilitating the nursing and administration, as the nurses' rooms, ward scullery, bath rooms and lavatories.

Hospital

They should all be well ventilated and lighted and all fittings finished in light color so that dirt can be at once detected. The nurses' room should command a view over the whole ward. The lavatory table should be constructed out of an impervious material, as slate or marble, with a row of sunk porcelain basins supplied with hot and cold water. The bath tubs should be porcelained iron. The toilets and urinals should invariably be placed against an outer wall, supplied with a siphon carrying a sufficient water capacity to thoroughly flush the basins. For the floor of these quarters, cement, marble or slate is perferable and the walls are to be lined with glass, white-glazed tiles, marble, slate or Parian cement.

The administration building, *i. e.*, for offices, reception rooms, lodging the staff, operating rooms, kitchen, store-rooms, dispensary, etc., should always be subordinate to the question of the accommodation of the sick. In hospitals where a school is to be established the necessary lecture rooms, laboratories and amphitheater should be kept entirely separate from the sick; the morgue and dissecting rooms should be as far removed as possible. The consensus of professional opinion is opposed to the present plan of constructing large edifices for hospital purposes; that the benefits they confer are greatly diminished by the risk of hospital diseases — fevers of certain forms, erysipelas, pyæmia, etc., and which when once installed are most difficult and often impossible to eradicate. A system of cottage and hut construction, any of which could easily be destroyed and replaced, should the emergency demand, has been seriously advocated, but found impracticable because of the great expense and administrative difficulties. The profession today favors a system of construction, known as the "pavilion plan," which can be called a compromise measure between the large block edifice and the cottage and huts. According to this system the wards are separate and distinct from the administration building and should be arranged to form pavilions, one story high, never more than two, and they should always surround the administrative blocks. This mode of construction is both applicable to large and small establishments. The Royal Infirmary of Edinburgh, the Herbert Hospital of Woolwich, the New York Hospital, the United States Marine Hospital of San Francisco are among the best examples of the pavilion style. There should be free circulation of air between the pavilions and the space between them should be exposed to the sunshine. The arrangements should be of a character to allow a covered communication between the wards and each pavilion should have its own broad stairway.

The pavilion and general construction of the administrative building should be made quite subservient to the accommodation for the sick and should never interfere with the light and air of the wards

Hospitals or asylums for inebriates; likewise hospitals for those addicted to the use of opium and other narcotics have lately been established throughout the United States. Fever hospitals are maintained in all communities to secure isolation in infectious diseases and hospital ships and floating hospitals are extremely valuable to promote complete isolation in cases of virulently infective disorders, such as SMALLPOX (*q. v.*), etc. Children's hospitals are often provided with swimming tanks, indoor and outdoor playing, large ball and tennis grounds and in fact any and everything to promote healthy exercise and pastime for the inmates.

Military and naval hospitals, establishments for the care of sick and wounded soldiers and seamen, exist in all civilized nations. They are either temporary or permanent and if the former located in the immediate vicinity of the scene of operation.

Hospital ships are ships fitted out as hospitals in all expeditions beyond the sea. They serve either as stationary hospitals or, if the sick accumulate sail home, or to the nearest station. I. E. COHN, M. D.

Hospitallers, or **Order of St. John of Jerusalem,** a military order originated in a monastery, chapel, and hospital, founded at Jerusalem by some merchants of Amalphi, in 1048. In 1099 the hospital received increased territories from Godfrey de Bouillon, who transferred its government from the monks to his knights. In 1113 they were confirmed as a spiritual order by Pope Pascal II. The Hospitallers greatly distinguished themselves in the crusades, especially at Jerusalem in 1152, and at Acre in 1191. In 1308 their order was united with that of St. Samson of Jerusalem. They conquered Rhodes, Aug. 15, 1309, and from their settlement in that island are sometimes called the "Knights of Rhodes." Their wealth was much increased in 1311 by the addition of the possessions of the suppressed Templars, which were granted them by the Council of Vienna. In 1321 they defeated the Turks in a great naval battle, and in 1341 took Smyrna. They took Alexandria in 1365, and in 1480 compelled Mohammed II. to retreat from Rhodes, which he had besieged with 100,000 men and 160 ships. In 1484 the possessions of the dissolved orders of the Holy Sepulcher and of St. Lazarus were bestowed upon the Hospitallers. In 1522 they were compelled to quit Rhodes by Soliman II., who besieged their garrison of 600 knights and 4,500 soldiers with a force of 140,000 men and 400 vessels, and in 1530 they were allowed to settle in Malta.

Hospital Saturday, a Saturday observed in England when those who from any cause have not contributed to the Hospital Sunday fund are invited to support the hospitals. Collections are made at factories, etc., and ladies take charge of boxes in the London streets. The first Hospital Saturday was Oct. 17, 1874.

Hospital Sunday, a Sunday observed in England hitherto always in June, when on an invitation sent out from the Mansion House, collections for the hospitals in the metropolis, which conform to certain conditions, are expected to be made in all the churches and chapels (Established and Nonconformist) in and around London. The prime mover in establishing Hospital Sunday in London was Canon Miller, then a clergyman in Greenwich. A formal resolution on the subject was carried at a meeting held in the Mansion House on Dec. 11, 1872, and collections simultaneously took place on Sunday, June 15, 1873.

Hospodar (hos-pō-där′), a Slavonic title once commonly given to the governors of Moldavia and Wallachia, whereas the King of Rumania is now known under the native Romanic title of *Domnu*. Lithuanian princes and Polish kings also bore the title.

Host, the consecrated bread or wafer used by the Roman Catholic Church in her celebration of the eucharist. It is unleavened, thin, flat, and of circular form, and has certain mystic signs impressed on its surface. The host is supposed after being blessed to be no longer bread and wine, but to be transformed into the real body and blood of Christ. In all Catholic countries, the elevation of the host is a ceremony which is generally adopted at certain times and seasons, when the consecrated wafer is raised aloft and carried in procession through the churches and streets of the city, the people falling on their knees and worshiping it in its passage past them. This custom is said to have originated in the 12th century, when it was thought necessary to make this public and conspicuous declaration of the eucharist, on the occasion of Berengarius promulgating his opinions against transubstantiation.

Hostage, a person given in pledge or security for the performance of certain conditions, or for the safety of others.

Hostilius, Tullus (hos-til′ē-us), the third of the legendary kings of Rome; succeeded Numa Pompilius in 670 B. C. He it was who made the arrangement by which the combat of the Horatii with the Curiatii decided the question of supremacy between Rome and Alba in favor of the former. He fought against Fidenæ and Veii, and con-

quered them; and destroyed Alba, and removed the inhabitants to Rome, giving them Mount Cælius to dwell on; and carried on war against the Sabines. At length the gods grew wrathful with him for his love of war and his neglect to worship them, and Jupiter Elicius consumed him and his house with fire about 638 B. C.

Hostrup, Jens Christian (hos'trup), a Danish author; born in Copenhagen, May 20, 1818. He was intended for the Church, but his talent as a writer of songs and plays, comic, patriotic, and sentimental, decided his career. "The Neighbors," a farce, made his reputation while yet a theological student. His best play is "Master and Pupil." Later, as a clergyman, he brought out more serious work: "Eva," a drama; a volume of "Popular Discourses"; and various other productions. His is one of the foremost names in later Danish literature. He died in Copenhagen, Nov. 21, 1892.

Hot Bed, a bed or stratum of stable-litter, tan, dead leaves, etc., in a state of fermentation, and therefore emitting heat, covered with a layer of earth, the whole having a glazed box surmounting it. A hotbed is used for the growth of melons, cucumbers, etc., or to afford temporary protection to seeds unlikely to germinate vigorously in the open air. It is less employed now than it was, various other appliances for producing artificial heat being known.

Hot Blast, a stream of air forced through a furnace and heated to 500° or 600°. The combustible gases from the stack are generally used to heat the air. For this purpose a kind of oven is built near the top of the stack, surmounted by a kind of chimney which draws off a portion of the inflamed gas. In this oven is a series of pipes through which the air is forced before it enters the stack. The hot blast effects a saving of heat, and accomplishes the reduction of the most refractory ores in less time and with a less expenditure of fuel than the cold blast. As the fusing metal is brought in contact with less fuel, and as less air is passed through the furnace, the chemical reactions are probably somewhat modified, but it is thought the quality of the product is not injured.

Hotchkiss, Benjamin Berkeley, an American inventor; born in Watertown, Conn., Oct. 1, 1826; was in early life a machinist and turned his attention to the invention of deadly weapons, most notable of which is the HOTCHKISS GUN (*q. v.*). He died in Paris, Feb. 14, 1885.

Hotchkiss Gun, a gun consisting of an inner tube over which is shrunk a jacket, the latter being extended at the breech and enlarged to carry the breech mechanism. The breech-block moves vertically in a slot cut through the extension of the jacket. The firing mechanism is carried within the breech-block, and the block moves vertically and falls of its own weight, the mechanism for opening and closing lifts the block up in closing and keeps it from falling open. The block is opened by means of a crank having a stud on the end which fits in a slotway in the right side of the block. When the crank is turned, the stud sweeps through its arc, and the block is carried up or down with it. The rocking-shaft carries the hammer and has a toe, which turns the rocking-shaft and retracts the hammer. When at full cock the firing system is caught by a gear actuated by the rear spring. During this movement of the crank, owing to the curve of the slotway, the breech-block does not move, but as soon as the hammer is cocked, the block descends, and as it moves down, the cartridge-case extractor is moved directly to the rear, starting the cartridge-case from its seat, and then throwing it out of the gun. In loading the gun, the charge is entered in the chamber and pushed home till the head of the case fetches up against the hook of the extractor. The block is closed by a reverse motion of the crank. As the block rises, the forward, upward edge pushes the cartridge and extractor home. When the breech is closed the cocking-toe is in position to allow the cocking-arm and hammer to act in firing. Pulling the trigger fires the charge. The recoil is taken up by a coiled spring carried in a small cylinder below the gun. The naval gun is mounted with its trunnions resting in a pivoted yoke which turns in a pivot stand.

Hotch Pot, or **Hotch Potch,** a commixture or mixture up of property for the purpose of division. The term is generally applied in reference to settlements by which a power is given to parents of appointing a fund among his or her children, wherein it is provided that no child, taking a share of the fund under any appointment, shall be entitled to any share in the unappointed portion, without bringing his or her own share into hotch potch, and accounting for the same accordingly. Also a kind of thick broth made by boiling together carrots and turnips sliced, young onions, green peas, lettuce, parsley, cauliflowers, etc., with lamb, mutton, or beef.

Hotel, a superior house of public entertainment for travelers or temporary sojourners; an inn. In France, the palace or town house of a nobleman, or person of high rank or great wealth; as, the "Hôtel de Suynes" In another sense it is nearly synonymous with the term hospital, and is applied to buildings set apart for the reception of sick and infirm paupers; as, the "Hôtel-Dieu," "Hôtel des Invalides."

Hotel de Ville, in France, a city or town hall.

Hot Springs, a city and county-seat of Garland co., Ark.; on Hot Springs creek, and on the Hot Springs railroad; 55 miles S. W. of Little Rock. The name was acquired from the presence in and near the town of thermal springs numbering over 70, that flow from the side of a hill and contain valuable medicinal qualities. These springs constitute a much frequented resort for invalids, the temperature of the water often reaching 150° F. The city contains a United States Army and Navy Hospital, the Convent of Our Lady of the Springs, and a National bank, and has daily and weekly newspapers, a large farming trade; and mines of lead, silver, and gold near the city. Pop. (1900) 9,973; (1910) 14,434.

Hottentots (hot'en-tots), the people who were in possession of the greater part of what is now Cape Colony when it was first visited and colonized by Europeans. The Hottentots were so called by the earliest Dutch settlers, puzzled at their strange harsh faucal sounds and clicks, Hottentot of Hüttentüt signifying a quack in Frisian or Low German. It is a somewhat misleading name, as it is popularly used to include the two distinct families distinguished by their native names: The Khoikhoi, the so-called Hottentot proper, and the Sān (Sā) or Bushmen, between whom little charity exists. Again, among the Khoikhoi proper, the terms Hottentots, Hottentots proper, or Cape Hottentots are often applied to the remnants of the tribes who formerly lived around Cape Town; while the inhabitants of Griqualand West, of the South Kalihari, and of Great Namaqualand are distinguished by their tribal names as Griquas, Namaquas, Koras or Koramas, as if they were not as much Hottentots as the Khoikhoi of Cape Colony. The Bushmen are hunters; the Khoikhoi, nomads and sheep-farmers.

At the present time the so-called Hottentots proper may number about 17,000; and the half-breeds, mostly employed in the Cape Colony, may number probably 100,000. The majority of the former and almost all the latter class are now semi-civilized, and copy the habits, customs, dress, and vices of the European colonists. In general they are of medium height, not very robust in build, and have small hands and feet. Their skin is a pale brown color; their hair woolly, growing in curly knots; their cheek-bones very prominent; and their chin pointed. The women are sometimes distinguished by certain organic peculiarities, and often have an enormous development of fat, especially in the breasts and hinderparts. Their principal characteristics in former days were indolence and hospitality. Their favorite amusements were feasting, dancing, smoking, and singing. The men were herdsmen, and not fond of war, though they liked to hunt. The women, though held in high esteem, performed all the manual labor. Their dwellings were huts of wood and mats, or tents, disposed in circles, and easily transportable. Their manner of living was entirely patriarchal: each tribe or division of a tribe had its own chief. Their method of perpetuating family names was that the sons took their mother's family name, while the daughters took their father's.

Houdon, Jean Antoine (ö-dâng'), a French sculptor; born in Versailles, March 20, 1740. After studying in Italy, he returned to Paris, and executed the busts of Voltaire, Rousseau, Molière, Franklin, Buffon, Catherine II., etc. He became, in 1778, member and professor of the Academy of Fine Arts. He was invited to the United States and carved the statue of Washington, now at the Virginia State capitol in Richmond, which is considered the most authentic likeness of "the father of his country." Houdon died in Paris, July 15, 1828.

Houghton, George Washington Wright (hō'ton), an American author; born in Cambridge, Mass., Aug. 12, 1850. His home was in New York. He wrote: "Songs from Over the Sea" (1874); "The Legend of St. Olaf's Kirk" (1881); "Niagara" (1882); etc. He died in 1891.

Houghton, Henry Oscar, an American publisher; born in Sutton, Vt., April 30, 1823; learned the printer's trade and later was graduated at the University of Vermont in 1846; established himself in the printing business in 1849; and founded the "Riverside Press" under the firm name of H. O. Houghton & Co. He introduced many great writers to the public. He died in North Andover, Mass., Aug. 25, 1895.

Houghton, Richard Monckton Milnes, Lord, an English statesman; born in Fryston Hall, Yorkshire, June 19, 1809. A Conservative in Parliament, he joined the Liberals under Lord John Russell, and in 1863 was raised to the peerage. His best poetry appears in: "Memorials of a Tour in Greece"; "Memorials of a Residence on the Continent, and Historical Poems"; "Poems of Many Years"; "Palm Leaves"; and a few other small volumes. His prose is remarkable for the purity of its Saxon style. It includes: "Life, Letters, and Literary Remains of John Keats"; "Monographs, Personal and Political"; and various essays in criticism. He died in Vichy, France, Aug. 11, 1885.

Hound, a name applied to dogs used in hunting. The true hound, such as the bloodhound, the foxhound, and the staghound, hunt only by scent. In this division may also be included the bassethound (a short-legged dog used in unearthing foxes and badgers), the beagle, and the harrier. The greyhound and the deerhound run by

sight alone, and are not hounds in the correct acceptance of the term.

Hour, the 24th part of a natural day; the space of 60 minutes. The early Egyptians divided the day and night each into 12 hours, a custom adopted by Jews or Greeks probably from the Babylonians. The day is said to have been first divided into hours from 293 B. C., when L. Papirius Cursor erected a sun dial in the temple of Quirinus at Rome. Previously to the invention of water clocks, 158 B. C., the time was called at Rome by public criers. In England, the measurement of time was, in early days, uncertain; one expedient was by wax candles, three inches burning an hour, and six wax candles burning 24 hours, said to have been invented by Alfred, A. D. 886.

Hour Angle, in astronomy, the angle formed at the pole at the instant of observation between the meridian of the plane and the hour circle or circle of declination, passing through the heavenly body. It is measured by the arc of the equator which has passed or will pass under the meridian of the observer between the instant of observation and the moment when the heavenly body is on the same meridian. Called also the horary angle.

Hour Circle, in astronomy, one of the great circles passing through the poles of the sphere, and necessarily perpendicular to the equinoctial. So called, because to note when the sun reaches each of these circles is a method of ascertaining the hour of the day. Hour circles are called also circles of declination. Also a small brass circle fixed to the north pole of a terrestrial globe, divided into 24 hours, and furnished with an index for pointing them out.

Hour Glass, a glass having two bulbs and a connecting opening through which the sand in one bulb runs into the other. The amount of sand and size of the opening are such that a given amount of time is consumed in the passage. Glasses of this description are yet used for marking small periods of time; such as, (1) the three-minute glass or egg glass, in which the sand passes in the time mentioned; (2) the half-minute glass used in ascertaining the rate of a ship by the log.

Houri (ou'rē), the name given by Europeans to nymphs of the Mohammedan paradise, whose company is to form the chief felicity of all "true believers." From the description given in the book on which the Mohammedan faith is grounded, it appears that the houris surpass both pearls and rubies in their dazzling beauty; they are subject to no impurity; are always represented with dark eyes concealed by long jet eyelashes, the languishing glances of which they reserve for the voluptuous enjoyment of "true believers" alone. They are not created of clay, like mortal women, but of pure musk, and are endowed with immortal youth, and every intellectual and corporeal charm. They dwell in green gardens, which are beautiful beyond what imagination can conceive, and they are always reclining on green cushions placed in fragrant bowers, where they await the advent of their possessors into paradise. The name houris is derived from the Arabic *hûr al oyûn,* signifying "black-eyed." Mahomet omitted nothing to render his heaven enjoyable to his disciples; and here he followed the traditions of the Hindu religion, among which there is one concerning the paradise, called *behisht,* and *menou,* which was furnished with *hurani beshisht,* or "black-eyed nymphs," endowed with similar attractions to those which the houris possess.

Housatonic River (höz-ä-ton'ik), a river which rises in Massachusetts, flows through Connecticut, and enters Long Island Sound near Bridgeport. In its course of nearly 150 miles it affords water-power to many manufacturing cities and towns.

House, a civilized dwelling. In point of law, the common expression, "a man's house is his castle," is in most instances true. Except where there has been a criminal offense, a man, in England and in the United States, can hold his house against all comers. In England, no bailiff can break open his door to arrest him, or seize his goods for debt, nor can any court give him this power; but if a bailiff is once permitted to enter he cannot be expelled. In the United States the law does not give the householder such a strong position. A court can give a messenger permission to force a door, and arrest or distrain as may be wished. Breaking into a house by night with the intent to rob is burglary.

In astrology the word "house" denotes the station of a planet in the heavens; a 12th part of the heavens as divided by great circles drawn through the north and south poles of the horizon, in the same way as meridians pass through the earth's poles. The heavens, visible and invisible, were thus divided into 12 equal parts, six being above and six below the horizon. These divisions, or "houses," were numbered from 1 to 12, beginning with that which lay in the last immediately below the horizon. The first "house" was the "house" of life; the second, of fortune or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death, or the upper portal; the ninth, of religion; the tenth, of dignities; the eleventh, of benefactors; and the twelfth, of enemies or captivity.

House, Edward Howard, an American journalist; born in Boston, Mass., Sept. 5,

1836; became a musical and dramatic critic in Boston and New York; afterward Professor of English Language and Literature in the University of Tokio, Japan (1871–1873), acting as correspondent of the New York "Herald." In 1900 he was appointed director of the Imperial Court Orchestra at Tokio, Japan. He wrote "Japanese Episodes"; "Yone Santo," a story of life in Japan; "The Midnight Warning, and Other Stories"; etc. He died Dec. 18, 1901.

House Boat, a species of summer residence now very popular. It consists of a flat-bottomed scow or float, on which is built a superstructure of several rooms, with balconies, awnings, etc. Some of the interiors are luxuriously furnished. During the pleasant season the house boat is moved from place to place on inland waters as fancy may dictate. House boats are growing rapidly in favor in the United States.

House Fly, in entomology, *Musca domestica.* The third joint of the antennæ is thrice the length of the second; the style is plumose; the eyes reddish-brown; the front of the head white; the neck black; the thorax blackish-gray, with four longitudinal black bands; abdomen blackish-brown, above with blackish elongated spots, pale yellowish brown beneath. The larvæ are called maggots; they live in decaying animal matter.

Household Arts. "I found Rome brick; I leave it marble," wrote the dying Augustus. A London paper summarized the bequests of the 19th century to the 20th under the caption "The Century in a Nutshell." "We received the goosequill; we bequeath the typewriter. We received the scythe; we bequeath the mowing machine. We received the hand loom; we bequeath the cotton and woolen factory. We received the tallow dip; we bequeath the electric lamp," are some of the clauses of the "Testament."

The imagination of the housewife of today "takes up the wondrous tale." One end of our great-grandmother's kitchen was nearly filled by the fireplace, 10 feet wide from jamb to jamb, and often 5 feet deep. A man of medium height could stand upright in the open space under the mantel. An iron crane, hinged at one end, reached quite across the chimney throat. The pothooks and hangers of our copy books are named for the wrought iron implements used to suspend pots and kettles from this sooty bar. Other utensils were upon the hearth, marshaled for duty among the coals of the wood fire that never went out. Rolls, biscuits, and single loaves were baked in a Dutch oven — a round or oval vessel with three or four short legs and covered by a closely fitting lid. Skillets, spiders, griddles, and even gridirons were furnished with legs or feet, that the air might reach the embers under them. Joints of meat and whole fowls were roasted upon a jack, or turnspit. The weekly — or semi-weekly — baking was done in a brick oven built into the wall and projecting upon the outside of the house like an ugly wen.

The cooking stove is a more recent invention than the "Franklin" stove; the range belongs to a yet later period. We who take with ungrateful nonchalance the infinite variety of "canned goods" within the reach of the humblest housewife, seldom bethink ourselves of the tedious methods by which our foremothers wrested raw materials from swift decay. Apples, pears, peaches, plums, cherries, grapes, were dried, each in its full maturity, to vary the monotony of potatoes, cabbages and turnips upon the winter bill of fare. Dried orange and lemon peel was desiccated, then pounded to season custards and puddings. Ice cream was flavored by rubbing oranges or lemons on lumps of loaf sugar, till the aromatic oil in the outer yellow rind was absorbed by the sugar. To get bitter almond flavoring, green peach leaves were bruised upon the hard lumps. Pulverized and granulated sugar had not been introduced to the favor of cook and housekeeper.

Soap, hard and soft, was made at home; the lye barrel, mounted on sticks, dripped periodically into a tub in the corner of back kitchen or woodshed, and, near at hand, awaiting the day of union, was the soap-fat jar. When weather and moon were propitious, lye and the hoarded grease met, mingled and were purified, the finer qualities into bars and cakes suitable for the laundry and even for the washstand, the inferior forming an uncomely semi-solid for scrubbing and scouring. North and East and South — there was no West to speak of — spinning wheels and looms were as abundant as sewing machines are today. Flax was raised in large quantities in many parts of the country. On some farms all the household linen was of domestic manufacture, beginning with the sowing of the flaxseed, up through the successive stages of pulling, threshing, rotting, breaking, scutching, hacking (or hatcheling), spinning and weaving.

Wherever cotton would grow it was cultivated and passed through the various processes of picking, carding, spinning and weaving into "domestic cloth," or homespun muslin. Woolen stuffs were made throughout from sheep raised on the home farm and plantation. And in all the width and length of the newly made United States of North America there was not a stationary washtub or washboard, neither clothes wringer nor clothespin; not a bathroom or kitchen where hot and cold water flowed like a river; not a gas pipe, or potato parer, or apple corer; neither register nor carpet sweeper; not a yeast cake or a fly screen,

Household Arts

or a baking powder; no gas works in the city, no kerosene in the rural districts; no outfitters to supply an endless chain of trousers for growing boys; no warehouse of babies' clothes; no ready-made lingerie and cloak emporiums.

This rapid and incomplete *résumé* of what we rate as the privations of the housewife of 1801, is the background of our picture. It is in no irreverent spirit that — in rehearsing to our grateful hearts the many inventions that have lessened manual toil and left us, the daughters of those hard-beset laborers free to cultivate the nobler part of our being — we are ready to cry out: "How long shall it be to the end of these wonders?"

We are not in the habit of speaking of Eli Whitney as a benefactor of womankind. His cotton gin was seven years old when practical housemothers wrote "1800" for the first time with fingers that were first sore then stiffened and calloused with separating pounds on pounds of raw cotton from the adhering seeds. "Picking cotton" was a task always allotted to women and children. It was usually done between the lights or in the long winter evenings. The work was tedious, tiresome and unwholesome.

When steam had ranged itself on the side of labor savers, wheels for spinning and looms for weaving flax, cotton, and wool were thankfully banished to the attic. The primitive cheese-press followed suit. The faucet of the hydrant superseded well-sweep and pump-handle, and the plumber — for long the servant of the rich — brought hot and cold water into the kitchen, set up a self-feeding boiler beside the sink, and laid a water-back behind the range which had supplanted the open fireplace with its host of clumsy appurtenances. The 19th century rolled on its shining way till the poor man could command the plumber's services; the bathroom became a necessity of decent living, and Bridget, Thekla and Dinah, lowering their homespun petticoats to the heels of the new machine-made shoes, in which their feet were still uneasy, would not "engage" in a house where there were not stationary tubs, and gas in the servants' rooms. Old lamps were worthless rubbish; the tallow dip, fashioned with pains and pride by our grandmother, was entirely forgotten in the luxury of paraffine and spermaceti bought by the box.

In 1830 whispers stole over the sea to incredulous ears of a French inventor who had devised a machine that would snatch the needle from flesh-and-blood fingers, attach it to a steel arm, and drive it through miles of "white work" at lightning speed. Sixteen years later the blessed home missionary was patented in America, and another burden heavy and grievous to be borne was lifted from our sex. Now every cottage has a sewing machine with all the latest amendments, almost as certainly as it has a cooking stove and a clothes wringer.

That larder is poor indeed that does not boast a tolerable store of vegetables, fruits and meats sealed away from the chances and changes of summer's heat and winter's cold. The art of canning has made weather and seasons a matter of indifference in the housewife's realm. The refrigerator has brought the choicest of exotic dainties to her door, with such staples as meat, poultry, fish and game, slain two thousand miles away, and perhaps two months ago. Our kitchens lay every zone under tribute; our houses are kept at summer warmth in January by steam; cooled in July by electric fans; lighted from basement to roof by the turn of a screw. When we will to abolish the dirt, the weight and the waste of coal, our cookery is done by gas. Before the new century is 10 years old we shall substitute electricity for gas in our cooking range, and in the steam heater for coal. Our carpets are swept by machines, beaten and cleaned by steam, renovated lifted and laid by professional adepts. Our grandmothers did their own clearstarching and washed their laces at the cost of so much time and trouble that the possession of the filmy treasures was a doubtful good. We send our "starched things" to the nearest laundry, our laces to "Madame," who mends as well as cleanses them to look as good as new.

On the deliverance from bodily drudgery wrought by the multitude of labor-saving machines and appliances followed intelligent ambition to elevate housekeeping into a dignified calling. We have created domestic science, and are developing it with maternal zeal. The cookery school is as significant a product of the woman's century as the girl's college. Chairs are established in such colleges for instruction in the chemistry of foods and practical training in the preparation of the raw materials, to fit them for the service and best good of the human race.

Our ancestors ate to live, and in a coarse, cumbrous fashion that makes us blush at the hearing thereof. The gist of hospitality lay in the proverbial groaning of tables upbearing reeking joints and haunches; stacks of vegetables, piles of puddings and pies. With us each meal is a gracious ceremony. The desire of the eye and the love of the beautiful are consulted in the commendation of the food to the palate. Individual appetite is studied by hostess and housemother. who also show a wise regard for constitutional idiosyncrasies.

In the days that are 100 years old, girls were poetically and popularly classified with orchids and chameleons. Eating was, at best, a vulgar necessity with women; a hearty appetite and the confession of it implied grossness and ill-breeding. The

clear-eyed, clear-headed modern woman, in sweeping away this prejudice, has arrived at a just comprehension of the values of foods, and how to adapt nourishment to age and physical needs. Children — thanks to domestic science — are fed with food convenient for their growth, and the aged have a dietary carefully adapted to a stage of existence that need not be second childhood because it is no longer the prime of maturity.

The marked improvement in the physique of American women, which can no longer be ignored by the most skeptical of pessimists, is usually accounted for by the freer, more active lives we have led during the last quarter-century. Bicycling and golf, yachting, boating and "camping out" should come in for their share of credit for the transformation. More is due to the radical change in the family habits and conditions. The substitution of elastic mattresses for feather beds; the even distribution of warmth in halls and rooms; sanitary sewerage and thorough ventilation; the orderly and leisurely sequence of well-cooked food in our bills-of-fare — in short, obedience to health laws of which our ancestors were ignorant in theory and in practice — have actually lengthened the average of man's mortal life, and made that life better worth living. MARION HARLAND.

Household Gods, among the Romans, deities known as the Lares and Penates, and presiding over the fortunes of the house or family.

Household Suffrage, suffrage based on the occupancy of a house or a distinct part of a house for not less than a year. In Great Britain it was established in boroughs by the Reform Act of 1867, and extended to the counties in 1884. Lodgers occupying lodgings which would let unfurnished for $50 a year are also entitled to rank under this suffrage.

Household Troops, a body of soldiers whose especial duty it is to attend the British sovereign and to guard the metropolis. These forces comprise three regiments of cavalry — the 1st and 2d Life Guards and the Royal Horse Guards; and three regiments of foot — the Grenadier Guards of three battalions, and the Coldstream and Scots Guards of two battalions each.

Houseleek (*Sempervīvum tectōrum*, natural order *Crassulaceæ*, a succulent plant, commonly to be met with on old walls and the roofs of cottages. The stem rises to the height of 8 or 10 inches, and bears a few purplish flowers, which have 12 or 15 petals. The leaves are applied by the common people to bruises and old ulcers.

Housemaid's Knee, an acute inflammation of the bursa or sac between the kneepan and the skin, so called because it is common among housemaids from their kneeling on hard damp stones. It is treated like other local inflammations by fomentations. Mild purgatives are also useful, and the limb ought to have complete rest.

House of Correction, a prison for idle and disorderly persons, and certain classes of criminals, such as prisoners convicted of felony or misdemeanor or vagrancy, or committed on charge of such. Originally vagrants, trespassers, and convicted persons were detained in these houses that they might be compelled to work. They are sometimes called bridewells.

Houssa, or **Haussa** (hous'sa), a region of Africa, in Central Sudan. This country, though yet little known, is represented as extremely fertile, and skillfully cultivated. It is under the rule of the Fellatahs, who have subjected the native inhabitants, the Haussana or Haussas, a race intermediate between the negroes and the Berbers, but generally ranked with the latter. They are intelligent and lively, expert weavers as well as agriculturists, and well acquainted with tanning and working in iron. Their language is rich and sonorous, and has become the general medium of commercial intercourse in Central Africa. They are Mohammedans. There are two large towns in Houssa — Sokota and Kashua. See SUDAN.

Houssaye, Arséne (ö-sī'), a French author; born in Bruyères in 1815. After contending seven years against poverty, he became connected, in 1838, with the "Revue de Paris," in which he commenced the publication of his "Men and Women of the Eighteenth Century," afterward collected in two volumes; and in 1846 he published his "History of Dutch and Flemish Painting." His works include "The Forty-first Chair"; "King Voltaire"; "Mademoiselle Cleopatra" and "Blanche and Marguerite." He died in 1896.

Houssaye, Henri, a French historian and critic; born in Paris, Feb. 24, 1848; son of Arsène. He studied painting, but transferred his attention to the study of Greek antiquity. During the siege of Paris in 1870 his gallant conduct earned him the Cross of the Legion of Honor. His valuable publications include: "History of Alcibiades and the Athenian Republic" (1875), crowned by the French Academy in 1874; "Athens, Rome, and Paris" (1878); "History of the Conquest of Greece by the Romans"; "1814," a history of the campaign in France and the Fall of the Empire.

Houston, a city of Texas, county-seat of Harris co.; situated on Buffalo bayou, about 51 miles N. W. of Galveston, and on several railroads, among which are the Missouri, Kansas, and Texas, the Houston and Texas Central, the International and Great

Northern, the San Antonio and Aransas Pass, the Southern Pacific, the East and West Texas Central, the Gulf, Colorado, and Santa Fé, the Galveston, Houston, and Henderson, and the Texas and New Orleans. Buffalo bayou gives direct water communication with Galveston bay and the Gulf. The Federal improvement of this bayou has continued until now deep water extends up to within a few miles of Houston. Already light craft do a thriving business between Houston and Galveston. Among the important buildings are the Carnegie Library, the high school, city hall and market, court house, and Federal building. In 1907 work was begun on the plans of the William M. Rice Polytechnic Institute, endowed by its founder to the amount of some $8,000,000. A new Federal building, costing $150,000, was also to be erected. Besides the public buildings, the many business blocks show Houston to be a city of great thrift and business enterprise. Houston has a large trade in lumber, cotton, rice, and cotton-seed oil. It has extensive factories and shops, among which are car shops, machine shops, carriage and wagon factories, oil mills, brick works, and foundries. Houston was founded in 1836 and named in honor of Gen. Sam Houston. It was the temporary capital of the Republic of Texas in 1837. Pop. (1900) 44,633; (1910) 78,800.

Revised by P. W. Horn.

Houston, Sam, an American soldier and statesman; born in Rockbridge co., Va., March 2, 1793; was of Scotch-Irish descent. In 1818 he began the study of law; in 1823 and 1825 was elected to Congress, and in 1827 governor of Tennessee. On removing to Texas in 1832 he was made a general of Texas troops. In 1836 he defeated the Mexicans at San Jacinto, which resulted in the independence of Texas, and he was elected president of the new republic. In 1845 Texas entered the Union, and Houston was chosen United States senator. He was elected governor of Texas in 1859, and was deposed for adherence to the Union in 1861. He died in Huntsville, Tex., July 25, 1863.

Houwald, Christoph Ernst (hö'väld), a German dramatic poet; born in Straupitz, Nov. 29, 1778. He wrote fables and juvenile stories, but his literary reputation depends wholly on his plays. "The Picture" and "Curse and Benison" are among his best works. In construction, vigor of style, and ingenuity of situation, he is remarkable. "The Prince and the Townsman" and "The Enemies" are striking examples in point. He died at Neuhaus, Jan. 28, 1845.

Hovenden, Thomas, an American painter; born in Dummanway, Ireland, Dec. 28, 1840; studied art in Cork, New York, and Paris, becoming an associate of the National Academy in 1881 and a national academician the following year. His pictures include "The Two Lilies"; "In Hoc Signo Vinces"; "Last Moments of John Brown"; and "Breaking Old Ties." He was killed by a railroad train near Norristown, Pa., while attempting to save a little girl, Aug. 14, 1895.

Hovey, Richard, an American poet; born in Normal, Ill., May 4, 1864. He was graduated at Dartmouth in 1885, and began to study for the Episcopal ministry, but abandoned that calling after a brief novitiate and went to Europe, where he led a bohemian life as actor, journalist, dramatist, and poet. Upon his return he lectured on English literature in Barnard College. He wrote: "Launcelot and Guenevere" (1880-98), a series of poetic dramas; "The Laurel: an Ode" (1889); "Seaward: an Elegy" (1893); "Songs from Vagabondia" (1893-96), with Bliss Carman; "Along the Trail" (1898); and "Taliesin: a Masque" (1900). He died in New York city, March 24, 1900.

Howard, one of the oldest families of England. The principal members are: Thomas Howard, Earl of Surrey, and third Duke of Norfolk; early obtained distinction by his talents, both as a naval and military commander, becoming in 1513 high admiral of England. The same year he won renown by defeating the Scotch at Flodden Field. In 1521 he was sent to Ireland as lord-lieutenant, where he suppressed a dangerous insurrection under O'Neal. He was afterward a leading member of the king's council, and was considered as the head of the Roman Catholic party, though he acted with so much prudence as to retain the favor of his capricious sovereign till near the close of his long reign. But in spite of all his services at home and against the Scots and the French, the suspicious jealousy of Henry at last condemned him on slight grounds to suffer the death of a traitor. Jan. 29, 1547, was appointed for his execution, but the king's death the preceding night procured him a respite. He was reinstated in his rank and property by Queen Mary, and died in August, 1554. By his marriage with a daughter of Edward IV. he became the father of the ill-fated and accomplished Henry Howard, Earl of Surrey, the best English poet of his age, who was born in 1516, and executed in 1547. Edward, a younger brother of the preceding, and admiral of England, killed in action with the French in 1512. Henry, Earl of Surrey, eldest son of Thomas, an accomplished chevalier, and the first polite writer of love verses in the English tongue, beheaded on a trumpery charge of high treason, 1516-1547. Henry, 2d son of the poet, and Earl of Northampton, known as a trimmer at court and as a man of letters, implicated in the murder of Overbury, 1539-1614. Charles, known as Lord Effingham and

Earl of Nottingham, and grandson of the Duke of Norfolk, commander of the channel fleet on the invasion of England by the Spanish Armada, 1536–1624. THOMAS, Earl of Arundel, and earl marshal in the reign of Charles I., known as a diplomatist and antiquary, died 1646. HENRY, his 2d son, and 6th Duke of Norfolk, by whom the Arundelian marbles, collected by his father, were presented to the University of Oxford, about 1668. CHARLES, 11th Duke of Norfolk, and formerly Earl of Surrey, known as a statesman in opposition to Lord North and Pitt, 1746–1815.

Howard, Bronson, an American playwright; born in Detroit, Mich., Oct. 7, 1842. He was connected with several newspapers in New York city, 1867–1872. Among his successful plays are: "Saratoga" (1870); "The Banker's Daughter" (1878); "Young Mrs. Winthrop" (1882); "The Henrietta" and "Met by Chance" (1887); "Shenandoah" (1889); "Aristocracy" (1892); "Peter Stuyvesant" (with Brander Matthews); etc. He died Aug. 4, 1908.

Howard, Catherine, 5th wife of Henry VIII.; born about 1520, was the daughter of Edmund Howard, 3d son of the second Duke of Norfolk. She was married, in 1540, to the king; but, two years afterward, he sent her to the scaffold, under pretext of unfaithfulness.

Howard, Edward, an English novelist; born 18—. After serving in the navy, he wrote sea stories; and was associated with Marryat in editing the "Metropolitan Magazine" in 1832. Later he joined the staff of the "New Monthly Magazine," then edited by Hood. His greatest work, "Rattlin the Reefer" (1836), met with much success. Among his other works are: "The Old Commodore" (1837); "Outward Bound" (1838); "Memoirs of Admiral Sir Sidney Smith, K. C. B." (1839); "Jack Ashore"; "The Centiad, a Poem in Four Books" (1841); "Sir Henry Morgan, the Buccaneer" (1842). He died Dec. 30, 1841.

Howard, Guy, an American military officer; born in Augusta, Me., Dec. 16, 1855, son of Gen. Oliver O. Howard; joined the United States army in 1876 as a 2d lieutenant; was promoted captain Jan. 7, 1893; chief quartermaster, with rank of lieutenant-colonel, Aug. 11, 1898; was assigned to duty in Manila under General Lawton; and had charge of the transportation for the advance movement of that general. On Oct. 21, 1899, while on the gunboat "Oceania," towing two cascoes, he was attacked by Filipino insurgents, and fatally shot. His last words were "Whatever happens, keep the launch going."

Howard, H. L. See WELLS, CHARLES JEREMIAH.

Howard, John, an English philanthropist; born in 1726. His father, a wealthy London tradesman, died when his son was about 19 years of age, and left him an independent fortune. In 1756 Howard undertook a voyage to Lisbon to view the effects of the recent earthquake. The vessel in which he embarked being captured, he was consigned to a French prison. The hardships he suffered and witnessed previously to his release first roused his attention to the subject of his future researches. In 1773 he resolved to devote his time to the investigation of the means of correcting the existing abuses in the management of prisons. With this view he visited most of the English county jails and houses of correction, and in March, 1774, he laid the result of his inquiries before the House of Commons, for which he received a vote of thanks. In 1775 and 1776 he visited many of the continental prisons, as well as those of Scotland and Ireland; and the substance of his investigations appeared in a work he published in 1777. This work was supplemented by his experiences of foreign prisons (1778–1783). In 1789 he published an "Account of the Principal Lazarettos in Europe." In the same year he made a final journey through Germany and Russia, when prisons and hospitals were everywhere thrown open for his inspection as a friendly monitor and public benefactor. He died of fever in Cherson in South Russia, in 1790.

Howard, Oliver Otis, an American military officer; born in Leeds, Me., Nov. 8, 1830; was graduated at Bowdoin College in 1850, and at the United States Military Academy in 1854; served in the Seminole War; was instructor in mathematics at West Point, 1857–1861; entered the Civil War as colonel of the 3d Maine Regiment; commanded a brigade at Bull Run, July 21, 1861; became Major-General of volunteers, Nov. 29, 1862; Commander of the Department of Tennessee in 1864; commissioner of Freedman's Bureau, 1865–1874; peace commissioner to the Indians of Arizona and New Mexico, 1872; Brigadier-General in 1864; Major-General, U. S. A., 1886; and was retired Nov. 8, 1894. He lectured and wrote: "Donald's Schooldays"; "Nez Perces Joseph"; "Life of Zachary Taylor"; "Isabella of Castile"; "Fighting for Humanity"; etc. He was military advisor of President McKinley in the American-Spanish war (1898). He died Oct. 26, 1909.

Howard College, a coeducational institution in East Lake, Ala.; founded in 1841, under the auspices of the Baptist Church; has endowment of $100,000; grounds and buildings valued at over $140,000; scientific apparatus, etc., $10,000; volumes in the library, 5,000; ordinary income, about $15,000; average faculty, 10; average students, 180.

Howard University, a coeducational non-sectarian institution in Washington, D. C.; founded in 1867; has grounds and buildings valued at about $2,000,000; volumes in the library, 51,000; ordinary income, about $135,000; faculty, 120; students, 1,200.

Howarth, Ellen Clementine (Doran), an American poet; born in Cooperstown, N. Y., May 20, 1827. The best known of her poems are "'Tis but a Little Faded Flower," and "Thou Wilt Never Grow Old." Her poems have been edited by Richard Watson Gilder (1868). She died in Trenton, N. J., Dec. 23, 1899.

Howe, Elias, an American inventor; born in Spencer, Mass., July 9, 1819. He constructed a sewing machine in 1846, and was for several years involved in expensive and harassing lawsuits to establish his right to reap the benefits of his own ingenuity. He died in Brooklyn, N. Y., Oct. 3, 1867. See SEWING MACHINE.

Howe, Henry, an American historian; born in New Haven, Conn., Oct. 16, 1816. Among his works are: "Memoir of Eminent Mechanics" (1839); "Travels and Adventures of Celebrated Travelers" (1853); "Adventures and Achievements of Americans" (1858); "Over the World" (1883); "Our Whole Country" (1861); "The Great West" (1851); and "Historical Collections of Ohio" (1891). He died in Columbus, Ohio, Oct. 14, 1893.

Howe, John Ireland, an American inventor; born in Ridgefield, Conn., July 20, 1793; was at first a physician, but in 1830 invented a pin-making machine. This he perfected later and revolutionized the pin manufacture with it. He died in Birmingham, Conn., Sept. 10, 1876.

Howe, Joseph, a Canadian orator and statesman; born near Halifax, N. S., Dec. 13, 1804; entered journalism, and in 1828 became editor of the "Nova Scotian," to which he contributed sketches and articles of remarkable ability. In this paper he also advocated the principles of responsible government with such force that he was prosecuted by reactionaries in authority, and defended himself in a speech which proved his possession of great oratorical gifts. He is truly called the founder of responsible government in his native province; but at first he did not, like other Nova Scotians of less intellectual gifts and probity, take a prominent part in Dominion politics because of his dissatisfaction with the terms on which Nova Scotia was induced to enter confederation. He held various positions in the provincial government; but, on the securing of better terms for Nova Scotia, he entered the Dominion cabinet of Sir John A. Macdonald in 1869 as secretary of state and henceforth gave his full support to confederation. In 1873 he was made lieutenant-governor of Nova Scotia. Howe was a man of great mental power and moral enthusiasm. Although not immediately connected with Canadian confederation, he had long pondered not only that problem, but the far larger problem of imperial federation, and many years before the latter was publicly discussed he had anticipated principles and plans which are the commonplaces of to-day. As an orator he was perhaps the greatest who has appeared in the public life of Canada. He died in Halifax, June 1, 1873.

Howe, Julia (Ward), an American author; born in New York city, May 27, 1819. A philanthropist, interested especially in woman's suffrage and prison reform, she was the wife of Dr. Samuel G. Howe, the philanthropist, and with him edited the anti-slavery journal, the Boston "Commonwealth." She is best known as the author of the "Battle Hymn of the Republic" (1861), written during a visit to the camps near Washington. Among her works, besides several volumes of verse, are: "The World's Own" (1857), a drama; "Life of Margaret Fuller" (1883); "Trip to Cuba" (1860); "Is Polite Society Polite? and Other Essays" (1898); and "Reminiscences" (1899). She died Oct. 17, 1910.

Howe, Richard, an English naval officer; born in 1725. He joined the navy at the age of 14, and in 1745 obtained the command of the "Baltimore." In 1758 he reduced Cherbourg. In 1776, with the rank of rear-admiral, he sailed for North America as joint commissioner with his brother William for restoring peace with the colonies. Having distinguished himself on many occasions, he was in 1782 created an earl. In 1783 he accepted the post of first lord of the admiralty. In 1797 Lord Howe exerted himself with great success to quell the mutiny among the seamen at Portsmouth. He died Aug. 5, 1799.

Howe, Robert, an American soldier; born in Brunswick co., N. C., in 1732; bore a prominent part in his State in the controversy with Great Britain, and on the outbreak of the Revolutionary War received a command, rising to the rank of major-general; was later repulsed by the British and forced to evacuate Savannah. He died in Brunswick co., N. C., Nov. 12, 1785.

Howe, Samuel Gridley, an American philanthropist; born in Boston, Nov. 10, 1801. He was graduated at Brown University in 1821, and at the Harvard Medical School in 1824. He served as a surgeon during the Greek war of independence from 1824 to 1827, organizing the medical staff of the Greek army. He then returned to the United States to raise contributions, and, returning with food, clothing, and supplies, formed a colony on the isthmus of Corinth. Swamp fever, however, drove him from the country in 1830. In 1831 he went

to Paris to study the methods of educating the blind, and, having become mixed up in the Polish insurrection, spent six weeks in a Prussian prison. On his return to Boston he established a school for the blind, his most famous pupil being Laura Bridgman. He also established a school for the training of idiots. In 1851–1853, assisted by his wife, he edited the anti-slavery "Commonwealth," and, after revisiting Greece in 1867 with supplies for the Cretans, he edited in Boston "The Cretan." He died in Boston, Mass., Jan. 9, 1876.

Howe, Timothy Otis, an American statesman; born in Livermore, Me., Feb. 24, 1816; received a common school education and became a lawyer. Settling in Wisconsin he entered politics, and in 1861 was chosen United States Senator, serving till 1879. He declined a Supreme Court judgeship on the death of Salmon C. Chase, but in 1881 accepted the postmaster-generalship in President Arthur's cabinet. He died in Kenosha, Wis., March 25, 1883.

Howe, Sir William, an English general; born Aug. 10, 1729. He was a brother of Admiral Richard Howe and successor of General Gage in the command of the British forces in America. His first exploit was the battle of Bunker Hill (1775), in which he lost one-third of his men present in the action. In August, 1776, he gained the battle of Long Island and took New York city. He obtained an advantage over the Americans at Brandywine in September, 1777, in consequence of which Philadelphia was occupied by his army. At his own request, he was recalled in 1778, and was succeeded by Sir Henry Clinton. He died July 12, 1814.

Howells, William Dean, an American author; born in Martins Ferry, O., March 1, 1837. He learned the printer's trade with his father; was afterward assistant editor on the "Ohio State Journal"; published a life of Abraham Lincoln. From 1861 to 1865 he resided in Venice as United States consul, occupying his leisure in mastering Italian and French. Soon after his return appeared a series of papers under the title "Venetian Life" (1866; new ed. 1891), followed next year by a similar volume, "Italian Journeys." After his return to the United States he was called to the editorial staff of the New York "Tribune," and also became a regular contributor to the "Nation." He was assistant editor of the "Atlantic Monthly" during the period 1866–1872, and editor-in-chief from 1872 till his resignation in 1881. In 1886–1892 he conducted the critical department of "Harper's Monthly" called "The Editor's Study." Among his works are "Venetian Life," "Italian Journeys," "A Chance Acquaintance," "A Foregone Conclusion," "The Lady of the Aroostook," "Dr. Breen's Practice," "A Modern Instance," "The Rise of Silas Lapham," "Indian Summer," "Their Silver Wedding Journey," "Literary Friends and Acquaintances," etc.

Howison, Henry Lycurgus, an American naval officer; born in Washington, Oct. 10, 1837; was graduated at the United States Naval Academy in 1858; appointed acting midshipman from Indiana, Sept. 26, 1854; promoted through various grades to lieutenant-commander, March 3, 1865; commodore, Aug. 19, 1897; rear-admiral, Sept. 30, 1898. In the Civil War he was present at the battle of Port Royal, engagements with rams off Charleston, 1862, engagements of Forts Moultrie, Sumter and Wagner, battle of Mobile Bay, etc.; was retired Oct. 10, 1899. In September, 1901, he was appointed a member of the Schley court of inquiry, and, on being challenged, was relieved from service.

Howison, Robert Reid, an American historian; born in Fredericksburg, Va., June 22, 1820. He became at first a lawyer, then a Presbyterian clergyman, and (1894) Professor of American History in the College of Fredericksburg. Works include: "History of Virginia"; "Lives" of Generals Morgan, Marion, and Gates; "History of the American Civil War"; "God and Creation"; etc. He died in 1906.

Howitt, Mary, an English writer; born in 1805. She married William Howitt; wrote a number of hymns and ballads, several volumes in prose and verse for children; and translated Miss Bremer's works and H. C. Andersen's "Improvisatore." Among her writings for the young are "The Children's Year," "The Dial of Love," "A Treasury of Tales for the Young," etc. In conjunction with her husband she also wrote "The Literature and Romance of Northern Europe," and "Ruined Abbeys of Great Britain." She died in 1888.

Howitt, William, an English writer; born in 1792. He began early to publish verses, and in conjunction with his wife published shortly after their marriage a volume of poems—"The Forest Minstrel" (1823). In 1831 appeared his "Book of the Seasons," in 1834 his "History of Priestcraft," and in 1838 his popular "Rural Life in England." In 1840 the Howitts settled at Heidelberg, and devoted themselves to introducing the literature of the North, especially of Sweden, to English readers. "Student Life in Germany" appeared in 1841, "Rural and Domestic Life in Germany" in 1842. In 1847 Howitt published his "Homes and Haunts of the British Poets," and, after a visit to Australia, his "Land, Labor, and Gold"; and "The History of Discovery in Austra-

lia." He also wrote a "History of England." Latterly both Howitt and his wife became converts to spiritualism. He died in 1879.

Howitzer (how'itz-er), a cannon, differing from ordinary guns in being shorter and lighter in proportion to its bore, and used for throwing shells or case-shot only, with comparatively small charges. The 7-inch breech-loading rifled howitzer in the siege artillery of the United States service has a weight of 3,750 pounds, and with 10 pounds of powder throws a projectile weighing 105 pounds. It is employed for horizontal, the mortar (*q. v.*) for vertical, fire. See also BOMB; GUNNERY; ORDNANCE.

Howling Monkey, or **Howler,** *Mycetes,* a genus of *Cebidæ,* and specially *Mycetes ursinus.* The name "howling" is given from the loud and resonant voice heard by Humboldt and Bonpland half a league away. The hallux is not opposable. The animals are clumsy in make, heavy in their movement, and hang on trees by their long prehensile tails. They inhabit the warmer parts of the New World, to a certain extent corresponding to the baboons in the Old. They are the largest monkeys in South and Central America.

Howorth, Sir Henry Hoyle, an English author; born in Lisbon, Portugal, July 1, 1842. He was a conservative Member of Parliament in 1886, and again in 1893. In recognition of his works on Eastern history and other subjects, he was created K. C. I. E. in 1892. In addition to over 70 scientific memoirs, contributions to periodicals, etc., he has published: "History of the Mongols," a large work marked by profundity of research; "The Mammoth and the Flood," which discusses the problems arising out of the destruction of the so-called palæolithic man; and other volumes.

Howth, a town of Ireland, on the peninsula which forms the N. boundary of the bay of Dublin, 8 miles E. N. E. of the city. It is a watering-place much resorted to by the residents of Dublin. The Hill of Howth, which forms a high rocky peninsula at the exeremity of the bay, is celebrated in history and literature.

Hoxie, Vinnie Ream, an American sculptor; born in Madison, Wis., Sept. 23, 1846; received an academic education; obtained a government clerkship and turned her attention to sculpture; executed busts of Grant, Sherman and others and a statue of Lincoln for the National Capitol. Her other works include ideal statues of "Sappho"; "The Spirit of the Carnival"; etc.

Hoy, an island of the Orkneys, Scotland, separated from the mainland of Scotland by the Pentland Firth, and from the largest island of the Orkneys, known as Mainland, by the Sound of Hoy. It is about 13 miles long and 6 broad; mountainous and heathy, but with fertile tracts. It has an excellent harbor, Long-Hope. At the S. W. of the island there is a detached pillar of rock 450 feet high, known as the Old Man of Hoy.

Hoyle, Edmond, an English writer on games; born in 1672. He is said to have been educated for the bar. Little is known about his life, except that he lived for some time in London, writing on games and giving lessons in whist, which he invented. In 1742 he published his "Short Treatise on Whist," containing the laws and some rules, for which he is said to have received $5,000, and which in 1763 reached a 13th edition. He died in London, England, Aug. 29, 1769.

Hoyt, Henry Martyn, an American lawyer and soldier; born in Kingston, Pa., June 8, 1830; was graduated at Williams College and became a lawyer in 1853. During the Civil War he attained the brevet rank of Brigadier-General; returned to his law practice, was made a judge, and 1878–1883 was governor of Pennsylvania. He die in Wilkesbarre, Pa., Dec. 1, 1892.

Hoyt, John Wesley, an American educator; born near Worthington, O., Oct. 13, 1831; was graduated at Ohio Wesleyan University in 1849, and later received degrees in medicine and law. He had charge of educational exhibits in leading international expositions, and was made chairman of the National Committee to Promote the Establishment of the University of the United States. Governor of Wyoming in 1878-1883. Works: "Progress of University Education"; "Studies in Civil Service"; etc.

Hsuan-Tung (family name PU-YI), Emperor of China; born in 1903; son of Prince Chun, a grandson of the Emperor Tao-Kuang; succeeded to the throne, on the death of his uncle, the Emperor Kwang-Hsu, Nov. 14, 1908, his father becoming regent of the empire during his minority.

Huallaga (wäl-yä'gä), a river of Peru, rising near the Cerro de Pasco, over 14,000 feet above the sea, flowing N. on the E. side of the Central Cordillera, breaking through the range at the gorge of Chasuta, and entering the Marañon. Its total length is about 650 miles; it is navigable as far as Yurimaguas, above which are falls and rapids.

Huamanga (wä-män'gä), or **Guamanga** (gwä-), a city of Peru, capital of a province of its own name and of the department of Ayacucho, on a tributary of the Apurimac, about 140 miles N. N. W. of Cuzco. This city was founded by Pizarro in 1539, and in this vicinity, in 1824, Sucré defeated the Spaniards, and thereby ended their rule in South America.

Huamantla (wä-mänt'lä), a town of Mexico, state of Puebla. It was the scene

of an engagement, Oct. 9, 1847, between the Mexicans under Santa Ana, and a small force of Americans, in which the former were defeated with considerable loss.

Huanaca (wä-nä′kä), or **Guanaco** (gwä-nä′kō), a species of the same genus with the llama, vicuña, and alpaca, of which some naturalists suppose it to be the wild original. It is found not only on the Andes, but throughout great part of Patagonia. It is of a reddish-brown color, the ears and hind legs gray. It generally lives in herds of 10 to 40, and is very quick-sighted and wary; although such is the strength of its curiosity that hunters at-

HUANACA.

tract the herds within easy reach of their rifles by lying down on the ground and kicking their feet in the air. Like its congeners, the huanaca is extremely sure-footed on rocky ground.

Huancavelica (wän-kä-vā-lē′kā), a department of Peru, entirely within the Cordilleras; area 8,710 square miles; pop. 223,796. The climate is cold and raw on the mountains, where sheep, cattle, and llamas are herded, and hot in the deep valleys, where sugar is grown. The chief riches are in the mines, especially of silver and quicksilver. The capital, Huancavelica, 150 miles S. E. of Lima, is a mining town in the sierras; pop. about 4,000, engaged in working some famous quicksilver mines close by.

Huanuco (wä′nö-kō), a department of Peru; area 23,000 square miles; pop. (1896) 145,309. Mining and agriculture are the chief industries. The capital, Huanuco, lies in a lovely valley on the Huallaga, amid plantations of coffee and sugar. It is a bishop's see. Pop. about 7,500.

Huanuco Bark, the grey or silver cinchona bark imported in the form of quills from around Huanuco in Peru. It is the produce of *Cinchona micrantha.*

Huascar (wäs′kär), or **Inti Cusi Huallpa** (ēn′tē kö′sē wäl′pä), a Peruvian Inca; born in Cuzco about 1490; ascended the throne on the death of his father Huayna Capac in 1523, but quarreled with his brother Atahualpa who had inherited part of the kingdom. Atahualpa captured Huascar and on Pizarro's invasion of Peru, the captive was put to death by his brother in January, 1533.

Huayna Capac (wä-ē′nä kä′päk), a Peruvian Inca; born in Cuzco, Peru, about 1490; was absolute despot of his country and made many conquests, and in his will divided the empire between two of his sons; was on the throne when the first Spanish expedition invaded Peru. He died in Tumipampa, Ecuador, in 1523.

Hubbard, Elbert, an American author and lecturer; born in Bloomington, Ill., June 19, 1859; settled in East Aurora, N. Y., where he established the Roycroft shop for making *de luxe* editions of the classics. He edited the "Philistine" and wrote "No Enemy but Himself"; "Little Journeys to the Homes of Good Men and Great"; "Forbes of Harvard"; "One Day"; "Little Journeys to the Homes of Famous Women" (1897); etc.

Hubbard, Lucius Frederick, an American soldier and physicist; born in Troy, N. Y., Jan. 26, 1836; received an academic education; settled in Minnesota and entered public life; enlisted as a private on the outbreak of the Civil War; and was mustered out in 1865 with the rank of Brigadier-General for conspicuous gallantry. In 1881 he was elected governor of Minnesota and was reëlected, serving till 1887. In the war with Spain he was a Brigadier-General of volunteers.

Hubbard, William, an American clergyman and author; born in Tendring, Essex, England, in 1621. He emigrated to Massachusetts in 1635, was graduated at Harvard College in 1642, and was minister of Ipswich for over 40 years. In 1688 he was temporary president of Harvard College. His chief works are: "The Present State of New England" (1677); "A Narrative of Troubles with the Indians" (1677), containing the first map of New England known to have been made in America; and "A General History of New England from the Discovery to 1680" (published by the Massachusetts Historical Society in 1815), for which the colonial authorities paid him £50. He died in Ipswich, Mass., Sept. 14, 1704.

Hubbell, Mrs. Martha (Stone), an American novelist and writer for the young; born in Oxford, Conn., in 1814. Besides a

number of Sunday-school books, she wrote : "The Shady Side, or Life in a Country Parsonage" (1853), one of the most widely sold books of its day. She died in North Stonington, Conn., in 1856.

Huber, François (ü-bār), a Swiss naturalist; born in Geneva, Switzerland, July 2, 1750. At an early age he lost his eyesight, but with the assistance of his wife and an intelligent domestic he conducted a number of original and important observations on the habits of bees. His book first appeared as "Letters to Charles Bonnet" (1792); it was reprinted in 1796, and again in 1814, under the title of "New Observations on Bees." In his later years he derived important aid from his son, Jean Pierre (1777–1841), who wrote a valuable treatise on the "Habits of Ants" (1810). He died near Geneva, Switzerland, Dec. 31, 1831.

Hubert, St., Bishop of Liége, son of Bertrand, Duke of Guienne; born in 656. He lived a luxurious and worldly life, first at the court of the Frankish king Theoderich, next under Pepin of Heristal, but after the death of his wife retired from the world into a monastery, on the advice of Bishop Lambert. Afterward, when on a pilgrimage to Rome, he was made by Pope Sergius I. Bishop of Tongern, and in 708 succeeded his master, Lambert, in the see of Maestricht and Liége. In legend and in art, since the 15th century, St. Hubert appears as a mighty hunter who was startled into repentance when hunting on Good Friday by the sudden appearance of a stag bearing between his horns a radiant crucifix. At once he renounced hunting and all worldly pleasures, and became the patron saint of hunters. His aid is especially efficacious for persons bitten by mad dogs and those possessed with devils. He died in 727, and was afterward canonized; his festival falls Nov. 3.

Hubertusburg (hö'berts-börg), formerly a royal hunting-seat of Saxony, 25 miles E. by S. from Leipsic, built in 1721 by Prince Frederick Augustus, afterward King Augustus III. of Poland. It was much injured during the Seven Years' War; and there Feb. 15, 1763, was signed the treaty by which that war was ended. Since 1840 the buildings have served as a prison, a hospital, an asylum for the insane, and a refuge for idiot children.

Hubli (hö'bli), a town of Dharwar in the presidency of Bombay, British India, on a road leading to Karwar on the Malabar coast, 102 miles S. W. It is one of the principal cotton marts in that section of India. Pop. (1901) 60,214.

Hubner, Charles William, an American journalist and miscellaneous writer; born in Baltimore, Md., Jan. 16, 1835. He spent several years in Germany, and served in the Confederate army in the Civil War. He wrote : "Souvenirs of Luther"; "Poems and Essays"; "Modern Communism"; "Cinderella" and "Prince and Fairy," two lyrical dramas; "War Poets of the South"; etc.

Hübner, Rudolf Julius Benno (hüb'ner), a German painter; born in Oels, Silesia, Jan. 27, 1806. He studied at Düsseldorf, to which school of painting he belongs. In 1841 he was appointed Professor of Painting in the academy at Dresden, and was director of the picture-gallery 1871–1882. Among his pictures are : "Job and his Friends," "Charles V. in San Yuste," "Frederick the Great in Sansouci," "The Golden Age," and "The Dispute between Luther and Dr. Eck." He also designed glass paintings, including some for the crypt of Glasgow Cathedral. He died in Loschwitz, near Dresden, Nov. 7, 1882.

Hub of the Universe, a humorous appellation popularly applied to the city of Boston, Mass. It originated with Holmes : "Boston State House is the hub of the solar system. You couldn't pry that out of a Boston man if you had the tire of all creation straightened out for a crowbar."

Huc, Evariste Régis (ük), a French missionary; born in Toulouse, France, Aug. 1, 1813. Ordained a priest in 1839, he went the same year to China as a missionary, traveling through the heart of the empire to Mongolia and Tibet, where he penetrated even to Lhassa. His experiences are recounted in "Souvenirs of a Journey to Tartary, Tibet, and China" (1852); "The Chinese Empire" (1854); "Christianity in China, Tartary, etc." (1858), all of which were translated into English. He died in Paris, France, March 26, 1860.

Huckaback, a coarse kind of linen cloth, figured somewhat like damask and usually employed for table-cloths and towelling.

Huckleberry, an American name for the WHORTLEBERRY (*q. v.*).

Hudde, Andreas, a Dutch-American colonial official; born in Holland about 1599; came to New York (then New Netherlands) in 1629, and for 34 years was active in the public affairs of the colony. He died in Delaware, Nov. 4, 1663.

Huddersfield, a town of England, in Yorkshire, on the Colme, 15 miles S. W. of Leeds. Manufactures narrow and broad cloths, serges, kerseymeres and various fancy goods. Near it are medicinal springs. Pop. (1901) 95,008.

Huddy, Joshua, a brave partisan officer of the Revolutionary War; hung by the Tories, April 12, 1782. His death caused the greatest indignation throughout the country, and the British authorities disclaimed and reprobated the act. In retaliation, the Continental Congress, by resolv-

tion, ordered General Washington to select for execution a British officer of equal rank (captain) from among the prisoners. The lot fell on Captain Asgill, son of Sir Charles Asgill, of London. Congress afterward spared Asgill's life through the urgent intercession of the French Minister, Count de Vergennes, and the States-General of Holland. Madame de Sevigné made the story of Captain Asgill the subject of a tragic drama.

Hudibras, the title and hero of a celebrated satirical poem written by Samuel Butler. The hero, Hudibras, is a sort of Quixotic adventurer, who sets out, accompanied by Ralpho, his "Sancho Panza," on a crusade against the sports, pastimes, and amusements of the English people, as tabooed and ordered to be suppressed by Cromwell's Puritan parliament. The work, though tainted with some coarse passages, and but little known nowadays except to readers of old English literature, is a wonderful example of biting wit and caustic humor, leveled against the far-fetched religious fanaticism of the period immediately preceding the restoration of Charles II.

Hudson, a city and county-seat of Columbia co., N. Y.; on the Hudson river, and on the New York Central and Hudson River railroad; 29 miles S. of Albany. It is the trade center of an extensive farming and manufacturing region and has steamship communications with all Hudson river points. Its manufactures include iron ware, woolen goods, bricks, machinery, beer, and ale. It is the seat of the State Home of Refuge for Women, and has electric lights and street railways, public high school, daily and weekly newspapers, 3 National banks, and an assessed property valuation of over $5,000,000. Pop (1890) 9,970; (1900) 9,528; (1910) 11,417.

Hudson, Frederick, an American journalist; born in Quincy, Mass., in 1819. He was connected with the New York "Herald" for nearly 30 years, retiring in 1866. He wrote: "History of Journalism in the United States" (1873). He died in Concord, Mass., Oct. 21, 1875.

Hudson, Henry, an English navigator; born in England. He entered the service of Holland. After making three voyages to find a N. E. or N. W. passage to China, in the second of which he discovered the Hudson river, he set sail a fourth time, April 17, 1610, in a bark named the "Discovery," and proceeding W., reached in lat. 60° N. the strait bearing his name. Through this he advanced along the coast of Labrador, till it issued into the vast bay which is also called after him. Here, with his son and seven infirm sailors, he was turned adrift by a mutinous crew, and was no more heard of.

Hudson, Henry Norman, an American Shakespearean scholar; born in Cornwall, Vt., Jan. 28, 1814. He served as chaplain in the Civil War, and was Professor of Shakespeare at Boston University, and was for a time editor of the "Churchman." He wrote: "Lectures on Shakespeare" (1848); "Campaign with General Butler" (1865); "Shakespeare, his Life, Art, and Characters" (4th ed. 1883); "Essays on Education, Etc." (1883); etc. He edited the Harvard and the University edition of Shakespeare. He died in Cambridge, Mass., Jan. 16, 1886.

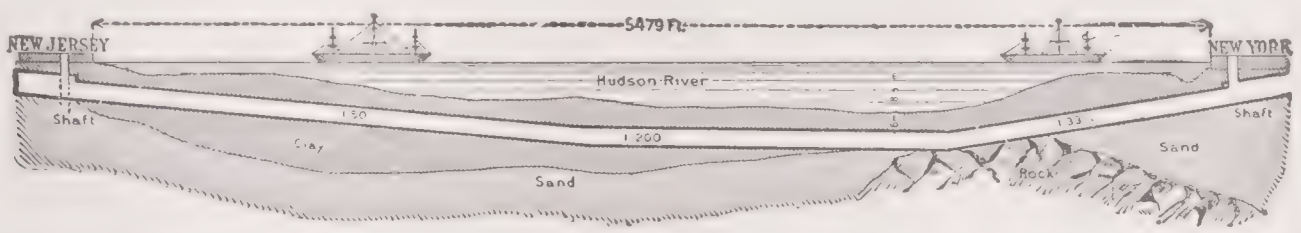
Hudson, Mary (Clemmer) (Ames), an American journalist and miscellaneous writer; born in Utica, N. Y., in 1839. She was at one time Washington correspondent of the New York "Independent." She wrote: "Ten Years in Washington" (1871); "Memorials of Alice and Phœbe Cary" (1872); "Men, Women, and Things" (1873); "Poems" (1882); and several novels, among them "His Two Wives" (1874). She died in Washington, D. C., in 1884.

Hudson Bay, an inland sea of British North America, between lat. 51° and 64° N., and lon. 77° and 95° W. Corinthian Gulf, Gulf of Boothia, and Fox Channel connect it with the Arctic Ocean on the N., and Hudson's Strait connects it with Davis Strait on the E. It covers an area of about 510,000 square miles, the S. part of which embracing about one-fourth of the bay, is called James Bay. Hudson Bay contains numerous islands, reefs, and sand-banks; and its shores are for the most part high, bold, and rocky; and though free from ice, is only navigable during a few months in the year. It was discovered by Henry Hudson.

Hudson Bay Territory, under this name is comprised a large proportion of N. W. America, extending from lat. 49° to 70° N., and from Cape Charles, Labrador, to the mouth of the Mackenzie river; area, between 2,000,000 and 3,000,000 square miles. The chief rivers are the Moose, Abbitibbe, Mackenzie, Nelson, Churchill, and Coppermine. Reindeer, musk-ox, moose-deer or elk, and other kinds of deer, bears, wolves, wolverines, foxes, beavers, otters, raccoons, and other small animals, valuable on account of their skins or flesh, abound. There are also numbers of water-fowl, and fish is abundant in the numerous lakes. The inhabitants are Esquimaux and Indians. The former occupy the country on both sides of Hudson Bay, while the latter are dispersed over the whole of the other regions. The number of Europeans settled here is considerable, amounting to several thousands, who are generally connected with the Hudson's Bay Company (*q. v.*). In 1870 this immense territory was ceded to the Dominion of Canada, and now forms the provinces of British Columbia, Manitoba

Saskatchewan and Alberta. See CANADA, DOMINION OF.

Hudson River, a river in New York State, and one of the most beautiful and important in America. It rises in the Adirondack Mountains, 4,326 feet above the level of the sea, its head-streams being the outlets of many mountain lakes. At Glen's Falls it has a fall of 50 feet, and soon after, taking a S. course, runs nearly in a straight line to its mouth, at New York city. It is tidal up to Troy, 151 miles from its mouth, and magnificent steamboats ply daily between New York and Albany. Below Newburg, 60 miles from New York, the river enters the highlands, which rise abruptly from the water to the height of 1,600 feet. Here historical associations add to the interest of scenery of singular beauty and grandeur: here was the scene of Arnold's treason and of André's fate; and at West Point, the seat of the United States Military Academy, 8 miles below Newburg, are the ruins of Fort Putnam, built during the war of independence. Emerging from the highlands, the river widens into a broad expanse called Tappan Bay, which is 4½ miles wide and 13 long. Below, on the right bank, a steep wall of trap rock, called the Palisades, rises from the river's brink to a height of 300 to 510 feet, and extends for nearly 20 miles to the upper portion of the city of New York. The river from here is known as the North river, and is from 1 to 2 miles wide; and after passing between New York and Hoboken and Jersey City, it falls into New York Bay. Its whole length is about 350 miles, and its principal tributaries are the Sacondaga, Mohawk, and Walkill. The Hudson has valuable shad and sturgeon fisheries. A railroad connecting New York with Albany, runs along the E. bank, and there is also a west shore railroad. The river, named from the English navigator who explored it in 1609 (see HUDSON, HENRY), is connected by canals with Lakes Erie and Champlain, and with the Delaware river. In 1894 a suspension bridge connecting New York and Jersey City was sanctioned, and the plans approved in 1895. The Pennsylvania and the Hudson & Manhattan Railroad systems have three tunnels connecting Jersey City, Hoboken, and Weehawken, in New Jersey, with New York city at Church and Morton streets and the Pennsylvania station on Sixth avenue.



HUDSON RIVER — LINE OF TUNNEL BETWEEN NEW YORK AND NEW JERSEY.

Hudson's Bay Company, an English company, established for carrying on the fur-trade, to which Charles II. in 1670 granted a charter, empowering it to trade exclusively with the aborigines in and about Hudson Bay. Prince Rupert was at the head of the Hudson's Bay Company, and as the fur-trade was then very lucrative, the association soon rose to prosperity. In the winter of 1783, a new company, calling itself the Northwest Fur Company, was established at Montreal, and actively opposed the Hudson's Bay Company. The Earl of Selkirk was then at the head of the old Winnipeg. The Northwest Company was jealous of this movement; and in consequence of the evil feelings arising out of opposing interests, a war broke out between the servants of the two companies. In this calamitous affair, many outrages and much barbarity were displayed. However, the companies wearied of the strife at last, and united under the name of the Hudson's Bay Fur Company, which at the present time engrosses most of the fur-trade of British America. The new company established factories and settlements in various parts — on the S. chiefly on the W. coast of Labrador, in the countries enclosing James Bay, and along the banks of Albany river. The principal settlements in the N. were on Hayes and Mackenzie rivers. They had numerous mart-houses, besides these factories, dispersed in all directions for upward of a 1,000 miles in the interior, to exchange cloths, blankets, trinkets, etc., for furs, skins, and feathers. The monopoly of this company ceased in 1859.

Hue, (höā'), the capital of Anam; 10 miles from the mouth of the Hué river, or Truongtien. In 1801 it was strongly fortified by French officers. The heart of the city is occupied by the palace; much of the rest of it is composed of mud huts. Since before Anam became a French protectorate, there has been a French resident at Hué; and since the treaty of Hué in 1884 there is a French garrison in Thuanan, the port of Hué. There is little industry in Hué, which has a population of 30,000 (with suburbs, 50,000), including a number of Chinese. See ANAM.

Hue and Cry, a phrase derived from the old process of pursuit with horn and voice, used in old English law to describe the pur-

suit of felons. Whoever arrested the person pursued was protected; and it was the duty of all persons to join in a hue and cry. The "Hue and Cry," a police gazette for advertising criminals, was established in London in 1710.

Hueffer, Francis (hüf'ner), an English musical critic and Provençal scholar; born in Münster, Westphalia, in 1845. He studied at Berlin, Leipsic, and Paris, and settled in London in 1869. He soon became an authority on music, was musical critic of the "Times," and was recognized as the champion in Great Britain of Wagner and Wagnerian music. In 1869 he edited the Provençal poet Guillem de Cabestanh, and in 1878 published "The Troubadours: a History of Provençal Life and Literature in the Middle Ages." Two works on Wagner were from his pen, one in 1874, the other in the "Great Musicians" series, in 1881. He died Jan. 19, 1889.

Huelva (wel'vä), a thriving town of Spain; near the confluence of the Odiel and the Tinto; 68 miles W. S. W. of Seville. Fishing and the plaiting of esparto grass are the chief industries. Huelva is the port for the important Rio Tinto copper mines, in British hands, and a shipping place for wine. An iron pier was erected in 1889–1890. About 500,000 tons of copper ore, 450,000 of iron ore, besides manganese, quicksilver, wine, etc., are annually exported; the imports, especially coal and coke, iron and steel, amount to 150,000 tons. Pop. about 19,000. The province of Huelva has an area of 3,913 square miles; pop. (1900) 260,880.

Huerta, Vicente Garcia de la (wer'tä), a Spanish poet and critic; born in Zafra, Estremadura, Spain, in 1730. He spent the greater part of his life in Madrid, where he was head of the Royal Library. His tragedy of "Raquel" (1778), founded on the story of the love of King Alfonso VIII. for the fair Jewess Rachel, was received with great enthusiasm, and is still esteemed one of the best of modern Spanish tragedies. Huerta was a zealous but not always consistent opponent of the prevailing Gallicism of his own day. As a lyric and dramatic poet he shows great command of language and versification. His poems were published in 1778–1779, and again in "Library of Spanish Authors" (vol. lxi.). Huerta edited the "Spanish Theater" (17 vols. 1785–1786), a collection of the best works of the older Spanish dramatists. He died in Madrid, Spain, March 12, 1787.

Huesca (wes'kä), a very old and picturesque town of Spain; on the Isuela, 55 miles N. E. of Saragossa. Its chief buildings are the cathedral (1400–1515), a beautiful Gothic edifice; the Romanesque church of San Pedro (1150–1241); the university founded in 1354 by Pedro IV.; and a former palace of the kings of Aragon. The Osca of the Romans, where Sertorius was murdered in 72 B. C., Huesca afterward became famous as a seat of learning. Tanning and manufactures of linens are carried on to some extent. Pop. 13,043. The province of Huesca has an area of 5,848 square miles; pop. (1900) 244,867.

Huet, Coenraad Busken (hu-ā'), a Dutch journalist and miscellaneous writer; born in The Hague, Dec. 28, 1826. He was pastor of a church till 1862, when he became editor of the "Haarlem Courant." He produced some of Holland's best literary criticism. "Literary Phantasies," "Dutch Literature," "Stories," and numerous essays, have given him a high place in the literature of Europe. He died in Paris, May 1, 1886.

Huet, Pierre Daniel (ü-ā'), a French critic and classical scholar; born in Caen, Normandy, in 1630. He was educated at the Jesuits' college at Caen; afterward went to Paris; accompanied Bochart to the court of Queen Christina of Sweden; was appointed in 1670 sub-preceptor under Bossuet to the dauphin, and superintended the celebrated Delphin series (ad usum Delphini) of the Latin classics. After the completion of his tutorship, having taken holy orders, he was made Abbot of Aulnai, and subsequently nominated Bishop of Soissons, which see he exchanged for that of Avranches, but latterly retired to an establishment of the Jesuits at Paris. He wrote: "Latin and Greek Songs"; "On Interpretation"; "Origin of the Romans"; "Strictures of the Cartesian Philosophy"; "History of the Commerce and Navigation of the Ancients," a book still of great value. He die in Paris, France, in 1721.

Hufeland, Christoph Wilhelm (hö'felänt), a German physician; born in Langensalza, Prussia, Aug. 12, 1762; pursued his profession at Weimar, and became, in 1793, professor in the University of Jena. In 1801 he was appointed physician to the King of Prussia, in 1809 Professor of Medicine in the University of Berlin, and finally director of the academy of military medicine and surgery in 1819. His celebrated work "The Art of Prolonging Life," was published in 1799; his "Counsels to Mothers on Physical Education," in 1800; and his "History of Health," in 1812. He died in Berlin, Aug. 25, 1836.

Hug, Johann Leonhard (hög), a Roman Catholic theologian; born in Constance, Baden, June 1, 1765. He entered into priest's orders in 1789, and was appointed Professor of Theology at Freiburg in 1791. He wrote: "Introduction to the New Testament" (1808), which was translated into most of the European languages. He died in Freiburg, Baden, March 11, 1846.

Huggins, Sir William, an English astronomer; born in London, Feb. 7, 1824. In 1856 he built for his own use an observatory at his home at Upper Tulse Hill, near London, where he devoted his time to the development of spectroscopic astronomy, or the study of the physical constitution of heavenly bodies. He was president of the Royal Astronomical Society from 1876 to 1878; president of the British Association in 1891, and president of the Royal Society in 1900-05. He received many honors from scientific societies in Europe. He died May 12, 1910.

Hugh of Lincoln, an English boy; supposed to have been murdered by the Jews of Lincoln, England, as told both in English traditional ballads and early chronicles. Chaucer's "Prioress's Tale" is an artistic elaboration of the theme.

Hughes, Charles Evans, an American lawyer, and thirty-ninth governor of New York State; born in Glens Falls, N. Y., April 11, 1862. In 1876 he entered Madison (now Colgate) University, at Hamilton, N. Y., and subsequently Brown University, from which he was graduated in 1881. After a course at the Columbia Law School he was admitted to the New York bar and began to practise law in 1884, continuing till 1891, when he accepted a professorship at Cornell, where he taught till 1893. In 1893-95 he was special lecturer at the Cornell University School of Law, and in 1893-1900 at the New York Law School. In 1893 he resumed active law practice in New York, and eventually won fame, particularly in the gas and insurance investigations which he so skillfully conducted (see INSURANCE, LIFE). In March, 1905, the New York legislature appointed a committee to investigate gas and electric lighting in New York city, and Hughes acted as chief counsel. His fearless handling of this important case, regardless of individual or corporate influence, and his equally thorough work, later in that year, as counsel for the Armstrong Commission in the investigation of New York life insurance companies, gave him a place among prominent public men. In 1905 he declined the Republican nomination for mayor of New York city. The following year he was nominated by the Republican party for governor of New York and elected by a plurality of 57,897. During his first term he won a national reputation by his urgency for reform, and in 1908 he was conspicuous as a possible candidate for the presidential nomination. He was reëlected in 1908, and entered on his second term vigorously pursuing his announced policies. He was appointed an Associate Justice of the United States Supreme Court, April 25, 1910, to take effect on Oct. 10, following.

Hughes, John, an American Roman Catholic prelate; born in County Tyrone, Ireland, June 24, 1797. In 1817 he came to the United States. He studied at the Roman Catholic College of Mount Saint Mary's, Emmitsburg, Md., was ordained priest in 1826, and after holding several important charges became Bishop of New York in 1842. He was the first Archbishop of New York, and held that office with great distinction from 1850 till his death. He died in New York, Jan. 3, 1864.

Hughes, Thomas, an English author; born in Uffington, Berkshire, Oct. 20, 1822. He was educated at Rugby under the famous Dr. Thomas Arnold (*q. v.*) and at Oriel College, Oxford, where he graduated in 1845. He was called to the bar in 1848 and began practice at once; in the same year he joined the Christian socialist movement under F. D. Maurice and Charles Kingsley, and in 1854 was one of the founders of the Workingman's College, London, of which he was principal in 1872-83. As an author he is known best by his first work, "Tom Brown's School Days," which appeared in 1857, and has remained quite unique in English literature; a sequel, "Tom Brown at Oxford," did not approach the success of its predecessor. Many works followed from his pen, historical, biographical, and critical, but none achieved notable distinction, though all are written in a graceful, polished style. He also had a long public career in which he strove to promote better understanding and conditions between employer and worker. He was an advanced Liberal in Parliament from 1865 to 1874, and presided at the first Co-operative Congress in 1869. In 1880 he aided the socialistic settlement at Rugby (*q. v.*), Tenn. He died in Brighton, March 22, 1896.

Hugo (hū'gō; Fr. ü-gō'), **Victor Marie,** a celebrated French poet and novelist; born in Besançon, France, Feb. 26, 1802. His father was a colonel in the French army. He received a classical education in a religious house, and in 1822 brought out the first volume of his "Odes and Ballads"; his tales "Hans of Iceland," and "Bug Jargal," were also written about this time. In 1826 he published a second volume of the "Odes and Ballads," which exhibited a change in his political and literary opinions, and in 1827 he composed his drama "Cromwell." In 1829 he published his "Last Days of a Condemned Criminal," a work which, owing to its fearful interest, secured an immense success. Hugo prepared a further attack on the classical style of French dramatic literature in his "Hernani," first played at the Théâtre Français in 1830, when it caused a scene of riotous confusion. The French Academy went so far as to lodge a complaint against Hugo's attempted innovations at the foot of the

private person." Shortly after the revolution of July, 1830, his "Marion de Lorme," which had been suppressed by the censorship under the Restoration, was performed with success. "The King Amuses Himself" was also performed at the Théâtre Français in January, 1832, but was indicted by the government the day after. His lyrical poems, "The Orientals," published in 1828, and "Autumn Leaves," which appeared in 1832, were received with enthusiasm.

Hugo, who published afterward a number of dramatic pieces of various merit, was,

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after much opposition, admitted into the Academy in 1841, and was created a peer of France by Louis Philippe. In 1849 he was chosen president of the Peace Congress of which he had been a leading member. On the coup d'état of Dec. 2, 1851, Hugo, then a member of the legislative assembly, was among those deputies who vainly attempted to assert the rights of the assembly and to propose the constitution. His conduct led to his proscription. He took refuge in the island of Jersey, and subsequently in that of Guernsey, having steadfastly refused to avail himself of the general amnesties issued in 1859 and in 1869. He wrote much after he had left France. His very trenchant satire, "Napoleon the Little," appeared at Brussels in 1852, and was rigorously suppressed in France, into which country it had been smuggled. "The Chastisements" was brought out in 1852, also in Brussels; and in 1856 he published, under the title "Contemplations," a collection of lyrical and personal poems which are among his best performances. Hugo's admirable romance, "Notre Dame de Paris," has been translated into most European languages, and is known in England and the United States under the title of the "Hunchback of Notre Dame." His social romance, "Les Misérables" (The Wretched), in which the author handles, in the form of a story, some of the most important social questions, appeared in 1862. On the fall of the empire in 1870 he returned to France, was elected to the National Assembly, but soon resigned and repaired to Brussels, whence he was expelled by the government on account of the violence of his political writings and his sympathy with the Communists. Returning to Paris, he was (1876) elected a senator for six years. Of his later works may be mentioned "The Man Who Laughs," "The History of a Crime," and "The Four Winds of the Spirit," a volume containing some of his most charming lyrics. He died in Paris, May 22, 1885, and was buried in the Pantheon.

Huguenots (hū'ge-nots), a nickname formerly applied by the Roman Catholics to the Protestants of France, who were nearly all Calvinists, and who converted the appellation into one of honor instead of reproach. D'Aubigné believed that the Reformation began in France in A. D. 1512, while that of Switzerland commenced in 1516, and that of Germany in 1517. For a time France seemed as likely as the other two countries to adopt Protestantism. Though Margaret, the sister of Francis I., had favored it, yet that king had been strongly against it, at least during the latter part of his reign, as were Francis II. and Henry II. It arose among the people, and through their sympathy became so formidable, that when, in 1561, a year after the accession of Charles IX., the Huguenots were prohibited from preaching, they took up arms to achieve religious liberty. The chief seat of their power was in the S. and W. of France, that of the Catholics in the N. and E. With an occasional hollow truce, or an interval of peace as hollow the struggle went on for the next century and a quarter. Its two most notable incidents were the Massacre of St. Bartholomew and the Revocation of the Edict of Nantes. (See BARTHOLOMEW, MASSACRE OF ST.: EDICT OF NANTES.) The name Huguenot has not been permanent. Those so called were afterward denominated Reformed or simply Protestant.

Huia Bird (*Heteralocha acutirostris*), a remarkable New Zealand starling, now restricted to a few wooded and mountainous regions. The plumage is black, except on the white tips of the tail feathers; there is a wattle at the corner of the mouth; the bill of the female is strikingly different from that of her mate, being long, much curved, and pliant, instead of straight and strong as in the male. The difference is so marked that the two sexes were formerly referred to distinct species. In digging grubs out of wood the two kinds of bills supplement one another. The birds, which are becoming rare, submit readily to captivity.

Hull. See KINGSTON-UPON-HULL.

Hull, a city of Quebec, Canada, the county-seat of Ottawa county; on the left bank of the Ottawa river and Chaudière falls, opposite Ottawa (*q. v.*), with which it is connected by 2 large bridges; and on the Canadian Pacific, Gatineau and Northwestern, and Pontiac and Pacific Junction railways. The water route by way of the Ottawa river to Montreal and thence to the sea is the highway of a large commerce. The leading business streets are Main, Albert, Wellington, Brewery, Bridge, and Charles. The principal residential streets are Laurier avenue, and Lake, Langevin, St. Joseph, Wright, Philomon, Inkerman, and Alma streets. Among the prominent buildings are Notre Dame de Grace Church (Roman Catholic), St. James' Church, court house and jail, city hall, Christian Brothers' College, Sainte Marie Convent, Notre Dame Hall, Lavigne Hall, Royal Skating Rink, English Dissentient School House, Bank of Ottawa building, and the Scott and Graham business blocks. The principal parks are the E. B. Eddy and Champagne parks. Street cars run to Aylmer's Victoria park. About four-fifths of the population are Roman Catholic, and the remainder Protestant. Besides the large college and convent, there are about 15 schools, and several charitable institutions and mutual benefit societies. There are 2 local weekly newspapers, but the Ottawa daily newspapers mainly supply the readers of Hull. The leading manufactures are sawed lumber, paper, matches, pails, tubs, wooden ware, Portland cement, clothing, mattresses, and axes. In 1906, according to the Dominion census, the manufactured output amounted in value to $4,892,381, as compared to $3,182,050 in 1901, an increase of 53 per cent. The city owns and operates the street-lighting and water-works plants. Hull was incorporated as a city in 1875. Pop. (1901) 13,988; official estimate (1909) 16,735.

Hull, Edward, an Irish geologist; born in Antrim, Ireland, May 21, 1829. As a member of the Geological Survey of Great Britain for 20 years, he geologically mapped a large portion of the central counties of England. In 1869 he became professor of geology at the Royal College of Science, Dublin; and in 1883 commanded an expedition under the auspices of the Palestine Exploration Society to Arabia Petræa and Palestine. Among his important works are: "The Coal-Fields of Great Britain" (1865); "Building and Ornamental Stones" (1872); "A Text-Book of Physiography" (1888); "Mount Seir, Sinai, and Southern Palestine" (1885); "Our Coal Resources at the Close of the Nineteenth Century" (1897).

Hull, Isaac, an American naval officer; born in Derby, Conn., March 9, 1775. In July, 1812, he commanded the frigate "Constitution," which was chased by a British squadron for three days, but escaped by skillful sailing. While cruising in the Gulf of St. Lawrence he met the British frigate "Guerrière," which, after a bloody fight of half an hour, surrendered, Aug. 19, 1812. The "Guerrière" was so injured in the battle that she soon sank. The British ship lost 100 men; the "Constitution" had 14 men killed and wounded, and within an hour or so was ready for another fight. This was the first naval battle of the War of 1812, and Congress gave Captain Hull a gold medal for his services. He died in Philadelphia, Pa., Feb. 3, 1843.

Hull, William, an American military officer; born in Derby, Conn., June 24, 1753. He was governor of Michigan Territory in 1805-1814. At the commencement of the War of 1812 he commanded the Northwestern army, and in 1812 surrendered with a force of 2,000 men to General Brock. In 1814 he was tried by court-martial on several charges, and condemned to be shot, but in consideration of his services the sentence was not carried into execution. He died in Newton, Mass., Nov. 29, 1825.

Hullah, John Pyke, an English musician; born in Worcester, England, June 27, 1812. He studied at the Royal Academy of Music, and in 1836 composed "The Village Coquettes" to Charles Dickens' libretto. In 1840 he inaugurated his popular singing classes in Exeter Hall, London, in which, during twenty years of teaching, he trained thousands in singing. He was for several years professor of vocal music in King's College, and taught at other schools and colleges in the metropolis; and from 1874 to 1882 was inspector of training-schools for the United Kingdom. Hullah, who followed a modification of Wilhelm's system, had little sympathy with recent developments of modern music, and opposed the "Tonic Sol-fa" method. He published a "History of Modern Music" (1862); "The Third Period of Musical History" (1865), etc. Of his songs, "The Three Fishers" and "The Storm" attained wide popularity. He died in London, England, Feb. 21, 1884.

Hulsean Lectures. The Rev. John Hulse (born in Middlewich, Cheshire, England, in 1708, was educated at St. John's College, Cambridge, and died in 1789) bequeathed his property to Cambridge University, for the founding of two divinity scholarships in St. John's College, the Hulsean Prize, the office of Christian Advocate (in 1860 changed into the Hulsean Professorship of Divinity), and that of Hulsean Lecturer or Christian Preacher. The lecturer, appointed annually, must deliver at least four lectures before the university, though the number required was originally 20, afterward reduced to 8, and since 1860 to 4. The subjects are: "The Evidence for Revealed Religion; the Truth

and Excellence of Christianity; Prophecies and Miracles; Direct or Collateral Proofs of the Christian Religion, especially the Collateral Arguments; the Most Difficult Texts or Obscure Parts of Holy Scripture." Among the lecturers have been Trench, Christopher Wordsworth, Ellicott, Dean Howson, Farrar, Dr. E. A. Abbott, and Bishop Boyd Carpenter.

Humane Society, The, an association formed in 1774 in London, England, for the purpose of resuscitating persons apparently drowned. At the present time it distributes rewards, consisting of medals, clasps, testimonials, and sums of money, to those who save or attempt to save life from drowning. Also "all cases of exceptional bravery in rescuing or attempting to rescue persons from asphyxia in mines, wells, blast-furnaces, or in sewers where foul gas may endanger life, are recognizable by the society." It likewise gives prizes for swimming to the pupils of public schools and of training-ships.

Humanists, a party which, during the Renaissance of the 16th century, cultivated literature, especially classical literature. Their influence was decidedly in favor of progress and reform, and in this way they may be considered as heralding and coöperating with the great religious reformers. Erasmus is the great type of the humanist, as Luther is of the religious reformer.

Humanitarians, a name assigned to anti-Trinitarians, who regard Christ as a mere man, and refuse to ascribe to Him any supernatural character, whether of origin or of nature (see UNITARIAN). The name Humanitarian is also sometimes applied to the disciples of St. Simon, and in general to those who look to the perfectability of human nature as their great moral and social dogma; also to those who, from over-philanthropy, object to severe measures, such as capital punishment, etc. For the religion of Humanity, see POSITIVISM.

Humanities, a term for humane or polite literature, including the study of the ancient classics, in opposition to philosophy and science. In the Scotch universities "humanity" is applied to the study of the Latin language and literature alone.

Humber, a large river, or rather estuary, on the E. side of England, between the counties of York and Lincoln. At its W. extremity it is joined by the Ouse, after the latter has been augmented by the Derwent and Aire; below Goole it receives the Don, lower down the Trent, and still lower the Hull from the opposite side. It is about 35 miles long, and varies in breadth from 1 to 7 miles. There is at all times a considerable depth of water in the fair way of the channel, and the navigation is safe and easy.

Humber, chief of the Huns, defeated by Locrin, King of England, and drowned in the river Abus, ever since called the Humber.

Humbert I., Italian **Umberto** (öm-ber'-tō), King of Italy; born in Turin, March 14, 1844. He was the eldest son of Victor Emmanuel. In the war of 1866, in which Italy joined Prussia against Austria, he took the field in command of a division, and distinguished himself by his bravery in the disastrous battle of Custozza. In 1868 he married his cousin, Margherita, daughter of Duke Ferdinand of Genoa. He succeeded his father Jan. 9, 1878, and was assassinated in Monza, near Milan, July 29, 1900.

Humble-bee, in entomology, the genus *Bombus*, called also and more accurately the bumble-bee. Darwin has shown that the humble-bees fertilize various plants by unintentionally brushing off the pollen when they are seeking honey in one flower, and carrying it, adhering to the hairs of their body, till they unwittingly clean it off against the pistil of some other individual of the same species. The field-mouse preys on them, the cat in turn devouring the field-mouse. The fertilization of certain plants may, therefore, be better performed near towns, where cats and consequently humble-bees are more numerous than in the country.

Humboldt, a river of Nevada, rising in the N. E. part of the State, and flowing W. S. W. to Humboldt Sink, a lake over 40 miles in circumference, which has no outlet; length, nearly 350 miles. The river, which is unnavigable even for canoes, is strongly impregnated with alkaline matter. The region through which it flows is barren, and the banks are destitute of trees or shrubs. The Central Pacific Railroad runs through the valley of the Humboldt.

Humboldt, Alexander von (höm'bōlt), a distinguished German scientist; born in Berlin, Sept. 14, 1769. His educational opportunities were worthy of his splendid intellectual gifts. From childhood he delighted in zoölogical, physical, and geographical investigations. At 28, on the death of his mother, he began the series of voyages memorable in the annals of science. No name is likely ever to stand higher on his country's roll than his: The "Cosmos" is a sufficient proof. "Voyages to the Equinoctial Regions of the New Con-

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tinent"; "View of the Cordilleras and of the Monuments of the Indigenous Races of America"; "Observations on Zoölogy and Comparative Anatomy"; etc., attest alike his Titanic genius and the singular charm of his literary style. He died in Berlin, May 6, 1859.

Humboldt, Wilhelm von, a German philologist, brother of Alexander; born in Potsdam, June 22, 1767. He was educated at Göttingen, and devoted to philological and literary studies; but he had strong practical gifts and elevated social sympathies. In 1789 he visited Paris to study the French Revolution, with which he sympathized; from 1802 to 1819 he was in active official life; minister to Vienna, member of the Privy Council, Secretary of State, ambassador to London, etc.; finally quitting it in disgust at the corruption he would not share. Meantime and later he wrote critiques on Goethe and Homer, and scientific and literary monographs, and translated Æschylus and Pindar. His main work in philology is "On the Kawi Language of the Javanese," but he made other valuable studies of primitive dialects. He died in Tegel, near Berlin, April 8, 1835.

Hume, David, a Scotch historian and philosopher; born in Edinburgh, Scotland, April 26 (o. s.), 1711. Originally designed for the law, he became, in 1734, clerk in a mercantile house at Bristol. Having a strong propensity to literature, for the sake of seclusion he went to France, where he wrote his "Treatise of Human Nature" (1738). This work excited no interest on its first appearance, though it holds an important place in the history of philosophy. Hume's "Essays, Moral, Political, and Literary," appeared in 1742 and 1752, and were favorably received. In 1745 he was invited to reside with the young marquis of Annandale. Here he spent a year; meanwhile the chair of moral philosophy in the University of Edinburgh having become vacant, he became a candidate, but failed. In 1746 he became secretary to General St. Clair, whom he accompanied to the courts of Vienna and Turin. In 1752 appeared at Edinburgh his "Inquiry Concerning the Principles of Morals, which of all his writings is considered the best. In 1754 he published the first volume of his "History of England," which he did not complete till 1761. While this work was in progress he published "The Natural History of Religion." His great work, "The History of England," had now acquired considerable celebrity, and the author gained largely by its popularity, for besides the profits it brought him, he obtained a pension through Lord Bute. In 1763 he accompanied the Earl of Hertford on his embassy to Paris, from whose fashionable and literary circles he received an enthusiastic welcome; and where, in 1765, he remained as *chargé d'affaires*. He became under-secretary of State in 1767. He died in Edinburgh, Scotland, Aug. 25, 1776.

DAVID HUME.

Hume, Fergus, a New Zealand novelist; born in England, July 24, 1862. Educated for the law, he was articled in the office of Sir Robert Stout, the well-known New Zealand statesman. His first long work, "The Mystery of a Hansom Cab," was published in Melbourne, and later in London, achieving a phenomenal circulation. After the success of his first novel the author devoted himself to literature in London. His most popular publications are "The Piccadilly Puzzle" (1889); "Miss Mephistopheles" (1890); "A Creature of Night" (1891); "An Island of Fantasy" (1894); "The Dwarf's Chamber" (1896); "The Indian Bangle" (1899).

Hume, Joseph, a British politician; born in Montrose, Scotland, in January, 1777. He studied medicine at Edinburgh, and in 1797 became assistant-surgeon in the service of the East India Company. He applied himself to the acquisition of the native languages, and during the Mahratta war, from 1802 to 1807, filled some half-dozen important offices, chief among which were those of interpreter and commissary-general. On the conclusion of peace he returned to England in 1808 and became a member of Parliament successively for Weymouth, Aberdeen, Middlesex, Kilkenny, and Montrose, this last from 1842 to his death, Feb. 20, 1855.

Humeral Veil, in the Roman Catholic ritual, an oblong scarf of the same material as the vestments, worn by the sub-deacon at high mass, when he holds the paten between the Offertory and the Paternoster; by the priests when he raises the monstrance to give benediction with the Blessed Sacrament; and by priests and deacons when they remove the Blessed Sacrament or carry it in procession. The humeral veil is worn round the shoulders, and the paten, pyx, or monstrance is wrapped in it. (See duties of Levites in Numbers iv.)

Humerus (hū′-), in human anatomy, the long bone of the arm, consisting of a shaft, an upper extremity articulating with the glenoid cavity of the scapula, and an in-

ferior articulating with the radius and the ulna. In comparative anatomy, the bone of the upper arm in the vertebrata.

Humic Acid, an acid obtained from HUMUS (*q. v.*), by treating it with a dilute boiling solution of caustic potassa and adding an acid. The humic acid is precipitated as a flocculent brown substance but slightly soluble in water.

Humiliati (-ā'tī), a reformed Benedictine Order, founded in A. D. 1017, by some Milanese gentlemen; suppressed by Pius V. in 1571, on account of the attempted assassination, by some of its members, of St. Charles Borromeo, who wished to reform them. Also an order of men and women in Lombardy, living by rule and in community; dissolved by Lucius III. and Innocent III. for heretical teaching and superstitious practices.

Humming Bird, one of a family of birds which may be termed the gems of animated nature; peculiar to America, and almost exclusively tropical. They are distinguished by their long and slender bill, and attenuated and retractile tongue which is divided into two filaments from the middle to the tip, and sometimes set with recurved spines. They feed on honey, though they are also insectivorous. Their flight is extremely rapid, and while feeding they remain poised in the air by means of the horizontal motion of their wings, which produces a humming noise, whence their common name is derived. The genus *Trochilus* is very extensive. Only one species is found in the N. E. part of the United States, the *T. colubris,* belonging to the sub-genus *Trochilinæ,* or those having straight bills. This well-known and splendid little bird arrives in Pennsylvania toward the end of April and begins to build its nest early in May. This is usually fixed on the upper side of a horizontal branch, seldom above 10 feet from the ground. It is hemispherical and about one inch in diameter, lined with vegetable down, and covered externally with lichen. The female lays two eggs of a white color. The humming bird is very fond of tubular flowers, particularly those of the trumpet vine. When he alights he always prefers the small dead twigs of a tree or bush, where he dresses and arranges his plumage with great dexterity. His only note is a single chirp, which is not louder than that of a cricket.

The humming bird is very irascible, two males scarcely ever meeting without a contest ensuing. They will also attack birds of a much larger size, as wrens or king birds, and sometimes have contests for a favorite flower with the bumblebee. From the beauty of these birds many attempts have been made to domesticate them, but unsuccessfully, though they have been kept from three to four months with attention. They are exceedingly susceptible to cold, and droop and die when deprived of the sun's rays. It is probable that insects form no inconsiderable portion of their food. They begin to retire S. in September, and in November take refuge for the winter in Florida. The common humming bird is 3½ inches in length, and 4¼ in extent. The whole back, upper part of the neck, sides under the wings, tail coverts, and two middle feathers of the tail, are of a rich golden green; the tail is forked, and, as well as the wings, of a deep brownish purple; the bill and eyes black; but what constitutes their chief ornament is the splendor of the feathers of the throat, which, when viewed in a proper light, rival the ruby in brilliancy. The female is destitute of them. The young males begin to acquire them in September. The family *Trochilidæ* has been divided into several groups, not all of which, however, are equally distinguished by brilliancy of coloring; in some the beauty of ornament is confined to the males. These birds are, on the whole, intellectually low; their eye is dull, and their movements are not regular as in the bees; for while the insect goes systematically through the flowers, the bird jerks from one to another.

Humor, in anatomy, etc., a liquid, a fluid. (See AQUEOUS HUMOR: EYE: VITREOUS HUMOR.)

According to Galen, etc., there are four humors, blood, choler, phlegm, and melancholy, lying at the bases respectively of the sanguineous, the bilious, the phlegmatic, and the melancholic temperaments. He believed that if all these humors were mixed in equal proportions, the temperament was a perfect one, but if, as was almost always the case, some one markedly predominated, then a person would show certain mental peculiarities produced by, or at least in harmony with the particular humor which preponderated in his physical temperament.

In mental philosophy, a mental faculty which tends to discover incongruous resemblances between things which essentially differ, or essential differences between things put forth as the same; the result being internal mirth or an outburst of laughter. Wit does so likewise, but the two are different. Humor has deep human sympathy, and loves men while raising a laugh against their weaknesses. Wit is deficient in sympathy, and there is often a sting in its ridicule. Somewhat contemptuous of mankind, it has not the patience to study them thoroughly, but must content itself with noting superficial resemblances or differences. Humor is patient and keenly observant, and penetrates beneath the surface; while, therefore, the sallies of wit are often one-sided and unfair, those of humor are, as a rule, just and wise.

Humoral Pathology, a medical hypothesis that many, if not most, diseases arise from a morbid state of the blood. Galen's doctrine of humors laid the foundation of it. Hermann Boerhaave (1667-1738) was one of its great advocates. Under the influence of Professor Cullen (1712-1790), etc., the humoral pathology was largely ignored, though in certain respects it still holds its ground.

Humpbacked Whales, or **Humpbacks,** the cetaceous genus *Megaptera*. The flippers are one-fifth to one-third the length of the body. They are akin to the finners, but are shorter and more robust. A specimen of *M. longimana*, taken near Newcastle and described by Dr. Johnston, of Berwick, was named Johnston's humpbacked whale. It was called also *Balænoptera boöps*. See BALÆNOPTERA.

Humphreys, Alexander C., an American engineer; born in Edinburgh, Scotland, in 1851; entered business in New York in 1867; and while employed as superintendent of the Bayonne and Greenville Gas Company, took a full course at Stevens Institute of Technology and was graduated in 1881. He then became chief engineer of the Pintsch Gas Company; three years later was appointed general superintendent of the United Gas Improvement Company. This position he held till 1895, when he formed the firm of Humphreys and Glasgow, gas engineers, whose business extended all over the world. In 1902 he was also president of the Hubbard-Rodman-Ely Safe Company, and of the Buffalo Gas Company. Mr. Humphreys was elected president of Stevens Institute of Technology to succeed the late Dr. Henry Morton in June, 1902.

Humphreys, Andrew Atkinson, an American soldier; born in Philadelphia, Pa., Nov. 2, 1810; graduated at West Point in 1831, and entered the artillery service; resigned in 1836, and engaged in government engineering work, reëntering the army in 1838 as first lieutenant in the corps of topographical engineers. From 1842 he was employed in government surveys till the outbreak of the Civil War, soon after which he joined McClellan's staff with the rank of major, and in the Peninsular campaign he served with the Army of the Potomac as chief topographical engineer. He was made brigadier-general of volunteers in 1862, and at Fredericksburg and Chancellorsville commanded a division of the Fifth Corps. At Gettysburg he commanded a division of the Third Corps and earned a major-generalship in the volunteer service. Later he was Chief of Staff to General Meade, commanded the Second Corps in the final campaign under Grant, and for his distinguished services in the battle of Sailors' Creek—the last great contest in the East, fought April 6, 1865—he was brevetted major-general in the regular army. Subsequently, with the regular rank of brigadier-general, he was placed in command of the corps of engineers. His writings include: "The Virginia Campaigns of 1864 and 1865" (1882); "From Gettysburg to the Rapidan" (1882); etc. He died Dec. 27, 1883.

Humphry, Sir George Murray, an English surgeon and author; born in Sudbury, Suffolk, England, July, 1820. He became Professor of Anatomy at Cambridge in 1866, and after 1883 held the professorship of surgery in that institution. He was knighted in 1891. He wrote: "A Treatise on the Human Skeleton" (1858); "On Myology" (1872); "Vivisection: What Good Has It Done?" (1882); "Guide to Cambridge" (1883); "Old Age and Changes Incidental to It" (1885), an oration. He died in 1896.

Hums. See HEMS.

Humus, a substance which occurs in vegetable mold, and in liquids containing decomposing vegetable matter. Humus as it exists in the soil is a product of the decay of vegetables. It is a mixture of various carbon compounds, which slowly undergo combustion with the production of carbon dioxide, water, and ammonia, which are again taken up by plants.

Hundred, a division of a county in England, supposed to be named from originally containing 100 families or freemen. A long hundred, a great hundred, the sum or number of 120.

Hundred Days, the period between March 20, 1815, the day on which Napoleon I. entered Paris after his escape from Elba, and June 29 of the same year, when he left it finally.

Hundred Penny, a tax formerly collected in England by the sheriff or lord of a hundred.

Hundred Thousand Islands, a native nickname for the Laccadive Islands, a coral group in the Indian Ocean.

Hundred-Weight, in avoirdupois weights, a weight containing by the legal standard in England 112 pounds. In the United States it is 100 pounds avoirdupois. It is subdivided into four quarters. It is usually written cwt. Twenty hundredweights make one ton. An English long hundred-weight is 180 pounds.

Hundstruck, an extensive and mountainous district of Rhenish Prussia, thickly wooded, and rising, at intervals, to a height of 3,000 feet. It lies between the Moselle and the Nahe, and joins the mountain chain of the Vosges.

Hungarian Leather, a white leather originally made in and imported from Hungary, but now manufactured in other countries.

Hungarian Sisters. See HELEN AND JUDITH.

Hungary. See AUSTRIA-HUNGARY.

Hungary Balsam, a kind of turpentine procured from *Pinus Pumilio,* the mountain pine of Hungary.

Hungary Water, a distilled water consisting of dilute alcohol aromatized with the tops of flowers of rosemary or other aromatic substances, used as a perfume; so called because first made for the use of a queen of Hungary.

Hunger. See FASTING.

Hungerford, a town of Berkshire, England; partly also in Wiltshire; on the Kennet river, 26 miles W. S. W. of Reading. It is a hunting center, and a favorite resort of anglers, having been even in Evelyn's time "a towne famous for its troutes." In the town hall (1870) is preserved a horn gifted to the town by John of Gaunt in 1362.

Hungerford, Mrs. Margaret (Hamilton Argles ("The Duchess"), an Irish novelist; born 1855. The daughter of an Anglican clergyman, she was left a widow with a young family to support, whereupon she took to literature. She wrote: "Phyllis" (1877); "Molly Bawn" (1878); "Airy Fairy Lillian" (1879); "Beauty's Daughters" (1880); "Mrs. Geoffrey" (1881); "Faith and Unfaith" (1881); "Portia" (1882); "Loys, Lord Beresford, and Other Tales" (1883); "Rosmoyne" (1883); "Doris" (1884); "O Tender Dolores" (1885); "A Maiden All Forlorn, and Other Stories" (1885); "In Durance Vile" (1885); "Lady Branksmere" (1886); "Lady Valworth's Diamonds" (1886); "A Mental Struggle" (1886); "Her Week's Amusement" (1886); "Green Pastures and Gray Grief" (1886); "A Modern Circe" (1887); "The Duchess" (1887); "Undercurrents" (1888); "Marvel" (1888); "Hon. Mrs. Vereker" (1888). She died in Bandon, Cork co., Jan. 24, 1897.

Hungry Hill, a mountain of Ireland, in Cork, 16 miles W. N. W. of Bantry. On the top of the mountain is a lake, whence the waters descend in a series of cascades, one falling nearly 700 feet. It is considered one of the curiosities of Ireland, and is a great resort of tourists.

Hunnewell, James Frothingham, an American bibliographer; born in Charlestown, Mass., July 3, 1832. He wrote: "Historical Monuments of France" (1884); "England's Chronicle in Stone" (1886), a study of English cathedrals, castles, and palaces; "Early American Poetry" (1894–1899); etc.

Hunooman. See HANUMAN.

Huns, the name given to several nomadic Scythian tribes, which devastated the Roman empire in the 5th century. They inhabited the plains of Tartary, near the boundaries of China, many centuries before the Christian era; and they were known to the Chinese by the name of Hiongun, and also Han. It was in order to put a stop to the continual aggressions of the Huns that the great wall of China was built; and after this the Huns split up into two separate nations, named respectively the Northern and the Southern Huns. The first-mentioned of these gradually went W. to the Volga, where they encountered the Alanni, whom they defeated. Here the Huns remained for about two centuries; but, under the Emperor Valens, they crossed the Bosphorus; afterward invading Rome, under their leader Attila. After the death of Attila the Huns broke up into separate tribes, and were driven back by the Goths beyond the Tanais. The Hungarians of the present day are the descendants of Huns, who once more immigrated into Europe.

Hunstanton, a watering-place of Norfolk, England, on the Wash, 18 miles N. E. of King's Lynn. It has a broad beach of firm sand, and good bathing and sea-fishing, a pier, and a splendid Decorated church (1330). Hunstanton Hall, dating from the Tudor period, but greatly injured by fire in 1583, was the seat of Sir Roger L'Estrange. A lighthouse (1840) lifts a fixed light to an altitude of 109 feet, and shows it for a distance of 16 miles.

Hunt, Freeman, an American biographer; born in Quincy, Mass., March 21, 1804. A publisher in New York, he was the founder of "Hunt's Merchants' Magazine." He wrote: "Lives of American Merchants"; "Sketches of Female Character"; etc. He died in Brooklyn, N. Y., March 2, 1858.

Hunt, Henry, surnamed ORATOR HUNT, an English agitator; born in Upavon, Wiltshire, England, Nov. 6, 1773. He was a well-to-do farmer, but in 1800 his hot temper embroiled him with Lord Bruce, the commandant of the Wiltshire yeomanry, which brought him six weeks' imprisonment. He came out of gaol a hot Radical and spent the rest of his life traveling about the country addressing the people on behalf of the repeal of the Corn Laws and as an advocate of parliamentary reform. In 1819, on the occasion of the Peterloo massacre, he delivered a speech which cost him three years' imprisonment. He died in Alresford, Hampshire, England, Feb. 13, 1835.

Hunt, James Henry Leigh, an English poet and essayist; born in Southgate, Middlesex, England, Oct. 19, 1784. He was the personal friend of Byron, Shelley, Hazlitt, Lamb, and Coleridge. In 1811 he was tried and acquitted for some remarks on the subject of flogging in the army, published in the "Examiner," a journal which he had founded. He was afterward sentenced, with

his brother, to a fine of $2,500 and two years' imprisonment for an alleged libel against the prince regent. Offers to remit these penalties on a promise to refrain from similar expressions for the future were firmly rejected; and on the expiration of their sentence they continued to write as before in the "Examiner." Subsequently he lived for four years in Italy, whither he had gone to set up the "Liberal." The "Story of Rimini" is his longest and perhaps his best known poem; and among his miscellaneous works may be mentioned his autobiography, and his essays, entitled "Men, Women, and Books"; "Imagination and Fancy"; "Wit and Humor"; etc. His "Correspondence" was edited by his eldest son. He died in Putney, England, Aug. 28, 1859.

Hunt, Richard Morris, an American architect; born in Brattleboro, Vt., Oct. 31, 1828; finished the study of his profession in Paris; returned to the United States and was employed on the extension of the National Capitol. Among the structures designed by him are the Presbyterian Hospital, Lenox Library, the William K. Vanderbilt mansion, the "Tribune" Building, etc., in New York city; the Yorktown Monument, Va.; the pedestal of the "Statue of Liberty," on Bedloe's Island, New York harbor; etc. He died in Newport, R. I., July 31, 1895.

Hunt, Thomas Sterry, an American chemist and geologist; born in Norwich, Conn., Sept. 5, 1826. He was for a period assistant to the elder Silliman at Yale College; 1847 to 1872 was chemist and mineralogist to the Canadian Geological Survey; Professor of Chemistry at Laval University (1856–1862) and at McGill University (1862–1868); 1872–1878 Professor of Geology in the Massachusetts Institute of Technology. In organic chemistry his name is identified with a system essentially his own, and his researches into the composition of rocks were of great importance. In 1859 he invented the green ink with which GREENBACKS (*q. v.*) are printed. He was made an officer of the Legion of Honor in 1867, and received numerous other distinctions, including a fellowship of the Royal Society (1859), and the degree of LL.D. from Cambridge (1881). He published over 200 papers and several larger works on chemistry and mineralogy. He died in New York city, Feb. 12, 1892.

Hunt, Ward, an American jurist; born in Utica, N. Y., June 14, 1810; was educated at Hamilton and Union Colleges, graduating in 1828; elected mayor of Utica; member of the New York Assembly. From 1865 to 1873 he was judge of the Court of Appeals of the State of New York, when he was appointed a justice of the Supreme Court of the United States. Retired Jan. 27, 1882, and died March 24, 1886.

Hunt, William Chamberlin, an American statistician; born in Charlestown, Mass., Dec. 20, 1856; was graduated at the Charlestown High School in 1875; engaged on the Massachusetts State Census in 1875 (1875–1877); was second clerk in the Massachusetts Bureau of Statistics of Labor and of the Massachusetts Census of 1885 (1883–1889); special agent in charge of the department of population of the 11th United States Census in 1889–1895; statistical expert in the United States Department of Labor in 1895–1899; and became chief statistician of the department of population of the United States Census in 1899.

Hunt, William Henry, an American jurist; born in New Orleans, La., Nov. 5, 1857; was educated at Yale; became attorney-general of Montana, 1885; district judge in 1889; justice of the Supreme Court in 1894; Secretary of Porto Rico in 1900; governor there in 1901; United States district judge in Montana in 1904; and an associate justice of the newly-created United States Court of Commerce in 1910.

Hunt, William Henry, an English painter; born in London, England, March 28, 1790. He was one of the creators of the English school of water-color painting. His subjects are very simple, but present the perfection of finish. He died in 1864.

Hunt, William Holman, an English painter; born in London, England, in 1827. He was trained in the Royal Academy school, and began to exhibit in 1846. He belongs to the so-called PRE-RAPHAELITE (*q. v.*) school of English artists. In 1853 his "Claudio and Isabella" first attracted public attention, followed next year by the "Light of the World" (Christ teaching in the temple). He then made a journey to the East, the fruits of which are observable in the local coloring and strength of realization in his succeeding pictures of Eastern life, among which are: "The Scapegoat" (1856); "The Finding of the Saviour in the Temple" (1860); "Shadow of the Cross" (1873); "Plains of Esdraelon" (1877); "Triumph of the Innocents" (1885). Mr. Hunt also painted: "Isabella and the Pot of Basil"; "The After-Glow"; "The Festival of St. Swithin"; etc. He died Sept. 7, 1910.

Hunter, David, an American military officer; born in Washington, D. C., July 21, 1802; was graduated at the United States Military Academy in 1822; assigned to frontier duty; promoted captain in 1833; resigned from the army in 1836 and settled in Chicago; reëntered the army in 1842 as paymaster with the rank of major. On

May 17, 1861, he was appointed Brigadier-General of volunteers and a few months later Major-General. He was given command of the Department of the South in March, 1862, and recruited and organized in South Carolina the first negro regiment in the Union army. He was transferred to the Department of West Virginia in May, 1864; defeated the Confederates at Piedmont, June 5, 1864; was chairman of the commission which tried the conspirators against the life of President Lincoln; brevetted Major-General, U. S. A., March 13, 1865, and was retired on account of age, July 31, 1866. He died in Washington, D. C., Feb. 2, 1886.

Hunter, John, a British surgeon and physiologist; born in Long Calderwood, Lanarkshire, Scotland, Feb. 13, 1728. He assisted his brother-in-law, a carpenter in Glasgow, for some time in his trade, but afterward went as assistant to his brother William, a prosperous surgeon in London. In 1756 he was appointed house-surgeon at St. George's Hospital, and also lectured in his brother's school of anatomy. In 1760 he became staff-surgeon and went with the army to Portugal. Three years afterward he returned to London, and, in 1768, was appointed surgeon to St. George's Hospital; in 1790 surgeon-general to the army, and inspector-general of hospitals. Hunter contributed greatly to the development of English surgery, as well as to the advance of anatomy and physiology. One of his chief works was "The Blood, Inflammation, and Gunshot Wounds" (1794). His museum of surgical and anatomical subjects was purchased by the government and presented to the Royal College of Surgeons. He died in London, England, Oct. 16, 1793.

Hunter, William, a British anatomist and obstetrician, elder brother of John Hunter; born in Long Calderwood, Lanarkshire, Scotland, May 23, 1718. Originally educated for the Church at Glasgow University, he studied medicine for one session (1740–1741) at Edinburgh, and then proceeded to London, where he went through a long training in anatomy at St. George's Hospital, etc. In 1747 he was admitted a member of the Corporation of Surgeons, ultimately confining his practice to midwifery. In 1764 he was appointed physician-extraordinary to Queen Charlotte. Elected a Fellow of the Royal Society, he in 1768 became Professor of Anatomy to the Royal Academy. Hunter and his brother John were for many years estranged, owing to a dispute as to the priority of certain discoveries; but the quarrel was made up while William was on his death-bed. His museum was bequeathed to his brother-in-law, Dr. Baillie, and after him, with an endowment of $400,000, to Glasgow University. He wrote: "An Anatomical Description of the Human Gravid Uterus and Its Contents." He died in London, England, March 30, 1783.

Hunter, William Randolph. See BRADFORD, JOSEPH.

Hunter, Sir William Wilson, an English statistician; born July 15, 1840. He was educated at the University of Glasgow and foreign universities, and was appointed to the Bengal Civil Service in 1861. As Director-General of Statistics he made a statistical survey of India, the results of which are embodied in the well-known "Imperial Gazetteer of India" (1881; 1885–1887). He was the author of "Annals of Rural Bengal" (1868; 5th ed. 1872), continued in "Orissa" (2 vols. 1872); "The Life of the Marquess of Dalhousie"; "A Dictionary of the Non-Aryan Languages of India and High Asia," "Brief History of the Indian Peoples," which has been translated into five languages; "History of British India" (Vol. I. 1899); and was the projector and editor of "The Rulers of India." He died Feb. 7, 1900.

Hunter, Fort, a defensive work at the confluence of the Mohawk river and Scoharie creek, N. Y., where many severe conflicts took place during the Revolutionary and the French-Indian wars.

Hunter-Duvar, John, a Canadian poet; of Scotch-English birth and education; born Aug. 29, 1830. He served as lieutenant-colonel of the 3d Brigade Halifax Garrison Artillery and of Prince Co. (P. E. I.) Battery of active militia; was Dominion Inspector of Fisheries for the Province of P. E. I., 1879–1889. He wrote: "The Enamorado"; "Roberval"; "The Triumph of Constancy"; "The Stone, Bronze, and Iron Ages"; etc.

Hunting, in ordinary language, the act or practice of hunting game or wild animals; the chase (see FOX-HUNTING). In campanology, a term in change-ringing. There are two kinds, hunting up and hunting down. The first is performed on any number of bells, by pulling after the bell which pulled last after you; the second is accomplished by looking out for which bell strikes first of the set, and altering its number in the set at each change till it has gone through the full number of the bells, and then returns to its original place. Thus, if it be first, it will next be second, then third, and so on, according to the number of bells, and return backward in counting.

Huntingdon, the county town of Huntingdonshire, England, on the left bank of the Ouse, and the Ermine street of the Romans, 59 miles N. of London. It became the seat of a royal castle in 917, and

was incorporated in 1189. It has breweries, brickworks, carriage-works, and nursery gardens. Here Oliver Cromwell was born (1599), and here the poet Cowper lived for a couple of years (1765–1767); the chronicler, Henry of Huntingdon, was Archdeacon of Huntingdon.

Huntingdon, a city and county-seat of Huntingdon co., Pa.; on the Juniata river, and on the Pennsylvania and the Huntingdon and Broad Top Mountain railroads; 202 miles W. of Philadelphia. It is the farming and mining trade center of the county; has coal mines, and stove, hosiery, sewer-pipe, and furniture factories. It is the seat of Juniata College, Orphan's Home, and State Industrial Reformatory. There are electric lights, public high school, daily and weekly newspapers, 2 National banks, and an assessed property valuation of $18,000,000. Pop. (1900) 6,053; (1910) 6,861.

Huntingdon, Selina, Countess of, an English reformer, daughter of Washington Shirley, 2d Earl Ferrers; born Aug. 24, 1707. She married the Earl of Huntingdon in 1728, and became a widow in 1746. Adopting the principles of the Calvinistic Methodists, she made the famous George Whitefield one of her chaplains, and assumed a leadership among his followers, who came to be known as "The Countess of Huntingdon's Connection." For the education of ministers she established and maintained a college at Trevecca, Brecknockshire (removed in 1792 to Cheshunt, Herts); and built, or became possessed of, numerous chapels in different parts of the country, the principal one being at Bath. Most of these have become, in doctrine and practice, almost identical with the Congregational churches. She died June 17, 1791.

Huntington, a city and county-seat of Huntington co., Ind.; on both sides of the Little river, and on the Wabash and Erie Canal, the Louisville, Evansville, and St. Louis Consolidated railroad; 48 miles N. E. of Evansville. It is in the center of a large coal mining and lime burning region, and has abundant water power, used in railroad repair shops, lime and cement works, bicycle, shoe, plow, and barrel factories. It has electric lights, public library, 3 public high schools, daily and weekly newspapers, a National bank, and an assessed property valuation of $4,000,000. Pop. (1890) 7,328; (1910) 10,272.

Huntington, a city in Cabell co., W. Va.; on the Ohio and Guyandotte rivers, and on the Chesapeake and Ohio, and the Huntington and Big Sandy railroads; 52 miles W. of Charleston. It has steamship communications with all important river ports, and extensive manufactures of railway cars, brick, machinery, ice, etc., and the shops of the Chesapeake and Ohio railroad. It is the seat of Marshall College, the State Normal School, and the Douglas Colored High School, and has electric lights and street railways, daily and weekly newspapers, 2 National banks, and an assessed property valuation of over $5,000.000. It was named after the late Collis P. Huntington. Pop. (1890) 10,108; (1900) 11,923; (1910) 31,161.

Huntington, Daniel, an American painter; born in New York city, Oct. 14, 1816. He studied at Hamilton College. In 1836 he spent some months in the Highlands of the Hudson, and painted several views. After a visit to Europe in 1839 he returned to New York and devoted himself to portraits, but he executed a great number of genre and historical pieces. In 1862–1869 he was president of the National Academy, and again in 1877–1891. Among his later works are "Philosophy and Christian Art" (1878), and "Goldsmith's Daughter" (1884). Among his portraits are those of Lincoln, Grant, and John Sherman. He died April 18, 1906.

Huntington, Frederic Dan, an American clergyman; born in Hadley, Mass., May 28, 1819. In early life as a Unitarian minister he held a pastorate in Boston from 1842 to 1855, when he became Plummer Professor of Christian Morals in Harvard University. In 1860 he withdrew from the Unitarian denomination, was ordained in the Protestant Episcopal Church, and in 1869 was consecrated Bishop of Central New York. His writings include: "Christian Believing and Living" (1860); "Lectures on Human Society" (1860); "Steps to a Living Faith" (1873); "Personal Christian Life in the Ministry" (1887); etc. He died July 11, 1904.

Huntington, Jedediah Vincent, an American author; born in New York, Jan. 20, 1815. Originally a physician, then an Episcopal clergyman, he became a Roman Catholic in 1849, and edited Roman Catholic magazines. He wrote: "Poems" (1843); the striking novels, "Lady Alice, or the New Una" (1849), "Alban, or the History of a Young Puritan" (new ed. 1853, with its sequel "The Forest" (1852), "Blonde and Brunette" (1859); etc. He died in Paris, France, March 10, 1862.

Huntington, Samuel, an American patriot; born in Windham, Conn., July 3, 1731. Having acquired a knowledge of the law, he soon became eminent in that profession in Norwich. In 1764 he was a representative in the General Assembly, and in 1765 was appointed king's attorney. In 1774 he became assistant judge of the Superior Court, and in the following year was elected to Congress. In 1784 he was appointed chief-justice, and in 1786 governor, to which office he was annually elect-

ed till his death, Jan. 5, 1796. He was one of the signers of the Declaration of Independence.

Huntsville, a town and county-seat of Madison co., Ala., on the Nashville, Cincinnati, and St. Louis, and the Southern railroads; 131 miles S. of Nashville, Tenn. It is a summer and winter resort and the seat of Huntsville Female College, Huntsville Academy for Boys, State Agricultural and Mechanical Institute for Negroes, and Lowry and Westmoreland Infirmary. Its manufactures include cotton, cotton-seed oil, flour, and sawmill products. There are daily and weekly newspapers, public high school, electric lights, 2 National banks, and an assessed property valuation of $3,000,000. Pop. (1890) 7,995; (1900) 8,068; (1910) 7,611.

Hunyady, János (hön'yo-di), a great Hungarian soldier; born in Hunyad, Transylvania, in 1387. His life may be succinctly described as one unbroken crusade against the Turks. He became voivode of Transylvania in 1442, and regent of Hungary on the death of Ladislaus I. of Poland in 1444. The principal moments in his celebrated contest with the foes of Christendom are his expulsion of them from Transylvania in 1442; his brilliant campaign S. of the Danube in 1443; his defeat in the bloody battle of Varna, 1444; and that of Kossovo in 1448; but his most glorious achievement was the storming of Belgrade (1456). During the minority of Ladislaus V. he acted as governor of the kingdom (1445–1453). Hunyady left two sons, Ladislaus and Matthias — the former of whom was beheaded at Buda on a charge of conspiracy; the latter succeeded to the crown of HUNGARY (*q. v.*). He died in Semlin, Croatia-Slavonia, Aug. 11, 1456.

Hunza-Nagar, the valley (containing the forts of Hunza and Nagar) of a river running into the Gilgit, at the extreme N. W. corner of Kashmir. Together with Kanjut, the upper part of the same valley, it became British in 1891.

Huon of Bordeaux (ü-ôn*g*), one of the Charlemagne cycle of romances. In its present form it is a prose version, dating from 1454, of a poem current about the end of the 12th century, and sometimes ascribed, without grounds, to the trouvère Huon de Villeneuve. In the story, Huon, Duke of Guienne, one of the paladins of Charlemagne, in self-defense kills Charlot, son of Charlemagne, and is in consequence condemned to die, but his life is granted on the hard condition that he brings back from Bagdad some of the Saracen emir's teeth and beard after having kissed his daughter before his face. The dwarf Oberon gives him a magical cup and horn, one blast of which in the hour of peril brings him and 100,000 warriors to Huon's aid. Moreover, the Princess Esclarmonde, like Medea, lightens his labors by falling in love with him, so that at last he is completely successful, and returns with her as his wife to clear himself before Charlemagne.

Hur, a chief man among the Hebrews in the desert, associated with Aaron in upholding the hands of Moses at Rephidim, and in supplying his place while on the summit of Sinai (Ex. xvii: 10).

Huraulite, a hydrous phosphate of the oxides of iron and manganese, occurring in small, yellow, reddish, or nearly colorless crystals, at Limoges, commune of Hureaux, France. Sp. gr. 3.18; composition: phosphoric acid 39.1; protoxide of manganese 40.2; protoxide of iron 8.3; water 12.4.

Hurd, Richard, an English clergyman and author; named the "Beauty of Holiness" on account of his comeliness and piety; born in Congreve, Staffordshire, England, Jan. 13, 1720. He studied at Emmanuel College, Cambridge, of which he became a Fellow in 1742. In 1749 appeared his first notable production, "Commentary on Horace's Ars Poetica." In 1750 he was appointed one of the Whitehall preachers. He became Bishop of Lichfield and Coventry in 1774, but exchanged this see for Worcester in 1781; in 1783 he declined the archbishopric of Canterbury. His principal works are: "Dissertations on Poetry" (1755–1757); "Dialogues on Sincerity, Retirement, the Golden Age of Elizabeth, and the Constitution of the English Government" (1759), his most popular book; "Letters on Chivalry and Romance" (1762); "Dialogues on the Uses of Foreign Travel" (1764); and "An Introduction to the Study of the Prophecies Concerning the Christian Church" (1772). He died May 28, 1808.

Hurdwar, or **Haredwara** (hur-dwâr'), a town of India, in Bengal, on the right bank of the Ganges, where the river emerges from the foot-hills of the Himalayas into the plains of Hindustan, 36 miles from Seharunpoor, lat. 29° 57′ N., lon. 78° 2′ E. From its position on this stream, esteemed so sacred by the Hindus, immense numbers of pilgrims are annually attracted hither, and the largest fair in India is held here every spring, which is attended regularly by from 200,000 to 300,000 persons. Every 12th year, this number is increased to fully 2,000,000, who come partly from purposes of devotion, and partly to trade in camels, horses, fruits, etc. Pop. (1901) 25,597.

Hurdygurdy, a musical instrument of ancient origin, popular among most of the European nations. It consists of a flat oblong sounding-board, on which are stretched four to six strings of catgut or sometimes wire, two of which only are carried direct to the tailpiece, and tuned in unison, and one or both are stopped by a simple ap-

paratus of keys, which shortens the vibratory length to make the melody. The strings are set in vibration by the friction of a wooden wheel charged with resin and turned by means of a handle at one end. The hurdygurdy is only adapted to the production of melodies of the simplest kind. In hydraulic engineering, a water-wheel with radial buckets, driven by the impact of a jet. In common use in California.

Hurlbut, Stephen Augustus, an American military officer and politician; born in Charleston, S. C., Nov. 29, 1815; at beginning of the Civil War he became a Brigadier-General of volunteers, in 1862; commanded a corps in the expedition to Meridian in 1864; was United States minister to the United States of Colombia, 1869–1873; Republican member of Congress from Illinois, 1873–1877; United States minister to Peru, 1881–1882; and died in Lima, Peru, March 27, 1882.

Hurlbut, William Henry, an American journalist; born in Charleston, S. C., July 3, 1827. After an extensive journalistic experience in New York, he became editor-in-chief of the New York "World" (1876–1883). After 1883 he resided in Europe. He wrote: "Gan-Eden" (1854), travels in Cuba; "General McClellan and the Conduct of the War" (1864); etc. He died in Italy, Sept. 4, 1895.

Huron, Lake, one of the five great lakes of North America, belonging to the basin of the St. Lawrence, second in size only to Lake Superior, and intermediate in position between that lake and Michigan, on the N. W. and W., and Lakes Erie and Ontario, on the S. and S. E. It is of a somewhat triangular shape, extending between lat. 43° and 46° 15′ N., and lon. 79° 30′ and 85° W., surrounded W. and S. W. by the State of Michigan, and all the other sides by the territory of Upper Canada; and divided into two unequal parts by a long peninsula and the Manitouline chain of islands, the parts to the N. and E. of which are called North Channel and Georgian Bay. The total length of Lake Huron, N. to S., is estimated at 280 miles, and its greatest breadth about 190 miles; area, estimated, 25,000 square miles. Elevation above the surface of the ocean, 596 feet. Greatest depth toward its W. shore at least 1,000 feet, and its mean depth is estimated at 900 feet, or about 300 feet below the level of the Atlantic. In various parts it abounds with islands, their total number being said to exceed 32,000, the largest, Manitoulin, "Evil Spirit" Island, nearly 90 miles long, and in one part almost 30 miles wide. Lake Huron receives the superabundant water of Lake Superior by the river St. Mary, at its N. W. angle, and those of Michigan at Michilimachinac; and discharges its own toward Lake Erie by the St. Clair at its S. extremity. Lakes Nipissing and Simcoe communicate with it by the Francis and Severn rivers, except which, however, Lake Huron receives no rivers worthy of mention. The banks of this lake are mostly low, especially along its S. and W. sides. Few towns of consequence exist on its shores, and its navigation is rendered dangerous by sudden and violent tempests.

Huronian Rocks, the name given by Sir William Logan to a series of strata lying in the vicinity of Lake Huron. They consist chiefly of quartzite with great masses of greenish chloritic schist, sometimes containing pebbles derived from the Laurentian rocks. The Huronian rocks are about 18,000 feet thick. No organic remains have yet been found in them, and limestones are rare, though one has been found 300 feet thick, which may yet be proved originally to have had connection with organic life. They are believed to be of Lower Cambrian age, and lie unconformably on the Laurentians.

Hurons, a once powerful tribe of American Indians, belonging to the Huron-Iroquois family. In the early part of the 17th century the Hurons numbered about 30,000 persons, living in 25 villages within a small territory near Georgian Bay. By the end of the century the tribe had been nearly destroyed by the Iroquois, famine, and disease; and in 1693 the few survivors were removed by the French to Jeune Lorette, near Quebec. Here 200 or 300 descendants still live; but very few are of pure blood, and all are Catholics, and have abandoned their own language for French.

Hursley, a village of Hampshire, England, 5 miles S. W. of Winchester. John Keble was vicar here, 1835–1866. In 1848, with the profits of the "Christian Year," he restored the church, which is rich in modern stained glass. Keble himself lies buried in the churchyard, and in the chancel is the grave of Richard Cromwell. See KEBLE, JOHN.

Hurst, John Fletcher, an American Methodist clergyman; born near Salem, Md., Aug. 17, 1834. He studied theology in Halle and Heidelberg, Germany, and became bishop in the Methodist Episcopal Church in 1880, and chancellor of the American University in 1891. He wrote: "Literature of Theology"; "History of Rationalism"; "Martyrs to the Tract Cause"; "Life and Literature in the Fatherland"; "Outline of Church History"; "Our Theological Century"; "Bibliotheca Theologica"; "Short Histories of the Church"; "Short History of the Christian Church"; "Indika," a large illustrated work on India, and one of great importance; "His-

tory of the Christian Church" (1897); translations of theological works and histories; etc. He died May 4, 1903.

Hurstmonceaux, a village of Sussex, England, 5 miles N. of Pevensey, with the extensive ivy-covered ruins of a fine castle, built of brick under Henry VI. by Sir Roger de Fienes, one of the heroes of Agincourt. It passed in 1727 into the hands of the Hares or Hare-Naylors. The famous Broad Church leader, Archdeacon Hare, was rector of the parish from 1832 till 1855, and lies buried in the churchyard. The church is Early English, with Perpendicular windows, and contains, among other ancient monuments, the fine canopied altar-tomb of the 2d Lord Dacre. See HARE, J. C.

Hurt, or **Heurt,** in heraldry, an azure or blue rondle; supposed by some to represent a hurt or wound, by others the hurtle-berry, whence the name is derived.

Hurter, Friedrich Emanuel, von (hör'ter), a Swiss theologian and historian; born in Schaffhausen, March 19, 1787. Appointed to a pastorate in his native town, he resigned in 1841, and became a convert to Roman Catholicism. In 1846 he was selected as historiographer to the Emperor of Austria. Of his numerous works, relating chiefly to mediæval and Church history, may be mentioned: "History of King Theodoric and His Reign" (1807); "Pope Innocent III. and His Contemporaries" (1834–1842); "Birth and New Birth" (1845), in which he gives his reasons for a change of religion; "Emperor Ferdinand II." (10 vols. 1850–1862); "Last Four Years of the Life of Wallenstein" (1862). He died in Gratz, Styria, Aug. 27, 1865.

Husband and Wife. Recent legislation in most countries has been in the direction of putting husband and wife on an equality, whereas formerly the wife to a great extent lost her separate status on marriage. Thus, for instance, by the English common law her personal property passed at once to her husband on marriage, though this might be obviated by special settlements, etc. But by the statute of 1882 a married woman can acquire, hold, and dispose by will or otherwise, of property as if she were an unmarried woman, and may enter into any contract, and sue or be sued without the participation of her husband. A woman carrying on a business separately from her husband is subject to the bankruptcy laws as if she were unmarried. Every married woman has, even against her husband, the same civil remedies, and also the same remedies by way of criminal proceedings for the protection and security of her own property as if she were unmarried; but she cannot take criminal proceedings against her husband while they are living together. Generally a husband is not bound by the contracts of his wife unless they are made by his express or implied authority. In the United States the tendency has been in the direction of putting husband and wife on a plane of equality. Each State has its laws governing the subject.

Husbandry, Patrons of, a combination, society, or association of farmers for the promotion of the interests of agriculture, by abolishing the restraints and burdens imposed on it by railway and other companies, and by getting rid of the systems of middlemen or agents between the producer and consumer. It was founded just after the Civil War, reputedly by O. H. Kelley, of Boston, Mass., and was especially designed to redress the grievances of the farmers in the West. The popular name of its members is Grangers. In 1875 the total number of granges (as the State and subordinate organizations are called), was estimated at 30,000, with a membership of nearly 2,500,000. The organization seems to have declined in the last few years.

Husch (hösh), or **Husi** (hö'sē), a town of Moldavia, near the Pruth, 38 miles S. S. E. from Jassy, cultivating tobacco and the vine. It was founded by fugitive Hussites in the 15th century. Here was signed in 1711 the treaty between the Russians and Turks by which Peter the Great rescued his army, surrounded by the foe.

Huskisson, William, an English statesman; born in Birch, Moreton, Worcestershire, England, March 11, 1770. In 1790 he became secretary to Lord Gower, the British ambassador at Paris; in 1795 undersecretary for war and the colonies; in 1796 member of Parliament for Morpeth; in 1804 Secretary of the Treasury; in 1814 chief commissioner of woods and forests; member for Liverpool in 1823; and president of the board of trade; in 1827 secretary of state for the colonies, under Lord Goderich. He had now come to be a recognized authority on all questions of trade and commerce. In 1828 a misunderstanding with the Duke of Wellington, then at the head of the cabinet, led to his withdrawing, with other Tories, from the administration. He was accidentally killed at the opening of the Liverpool and Manchester Railway, Sept. 15, 1830.

Huso, *Acipenser huso,* the Beluga or isinglass sturgeon. It is sometimes 12 or 15 feet long, and weighs 1,200 pounds. One mentioned by Cuvier reached 3,000 pounds. It inhabits the great rivers falling into the Black and Caspian Seas. The best isinglass is made from its air-bladder.

Huss, John (hös), a famous Bohemian reformer of religion; born of humble parents in Husinetz, near Prachatitz, Bohemia, July 6, 1369. He became a priest in 1400. Huss was a realist in philosophy,

and adopted the views of WYCLIFFE (*q. v.*), whose works he translated and whose doctrines he preached, giving great offense to the Archbishop of Prague. Huss appeared by citation before the Council of Constance, and, though provided with a safe-conduct from the Emperor Siegmund, or Sigismund, he was adjudged a heretic, and burned alive July 6, 1415, as was his disciple Jerome of Prague, on May 30, 1416. By the decision of the Council of Constance, in 1414, the request of the Bohemian laity to communicate under two kinds was refused. The treatment of Huss exasperated his followers, and led to a religious war in which great ferocity and cruelty were manifested on both sides. The Hussite leaders were John Ziska, and after his death Procopius. Sigismund commanded the imperial forces. The Hussites fortified a mountain near Prague, which they called Mount Tabor (see TABORITES). Before Ziska's death, Oct. 12, 1424, after obtaining religious liberty for Bohemia, the Hussites had begun to split into minor sects, as the Orebites, or Horebits, the Orphanites, and the Calixtines. In 1433, the Calixtines were conciliated by the concession of the cup to the laity (see UTRAQUISTS). By the treaty of 1435, Siegmund was acknowledged King of Bohemia, which, however, remained in an uneasy state. The Hussite troubles prepared the way for the Lutheran Reformation. See PROCOPIUS: ZISKA, JOHN.

Hussite, a follower of John Huss.

Hustab, one of the idols of the ancient Ninevites.

Husted, James William, an American politician; nicknamed "the Bald Eagle of Westchester"; born in 1833. He was graduated at Yale in 1854; then taught school and read law; finally drifted into the political arena, and in 1869 was elected to the Assembly of his native State. He was reelected 15 times, and was chosen speaker in 1874, 1876, 1878, 1886, and 1887, defeated in 1888, but again elected in 1889. Besides that he was superintendent of public schools, school commissioner, deputy superintendent of insurance, harbor master, deputy captain of the port of New York, judge-advocate of the 7th Brigade, and Major-General of the 5th Division National Guard. He died in Peekskill, N. Y., Sept. 25, 1892.

Hustings. (1) A name given to a court formerly held in many cities of England, as York, Winchester, Lincoln, but especially applied to the county court of the City of London held before the lord mayor, recorder, and sheriffs. (2) The platform from which candidates for seats in Parliament addressed the constituency on their nomination, previous to the Ballot Act of 1872.

Hutcheson, Francis, a Scotch educator and philosopher; born in Drumalig, Ulster, Ireland, Aug. 8, 1694. For many years a public teacher in Glasgow, he became in 1729 Professor of Moral Philosophy at the university in that city. He is regarded as one of the founders of modern philosophy in Scotland. He was the author of: "Inquiry Into the Original of Our Ideas of Beauty and Virtue" (1720); "Nature and Conduct of the Passions and Affections" (1728); "System of Moral Philosophy" (1755). He died in Glasgow, Scotland, about 1746.

Hutchins, Thomas, geographer-general to the United States; born in New Jersey, about 1730. He served in the army against the Indians in Florida; was imprisoned in England in 1779, on the charge of having corresponded with Franklin, then American agent in France; and afterward joined the army of General Greene. He published several topographical and historical works. He died in Pittsburg, Pa., in 1789.

Hutchinson, a city and county-seat of Reno co., Kan.; on the Arkansas river, and on the Atchison, Topeka, and Santa Fé, the Chicago, Rock Island and Pacific, the Hutchinson and Southern, and the Missouri Pacific railroads; 40 miles N. W. of Wichita. The city has one of the largest salt interests in the world, producing about 6,000 barrels per day. It is also an important meat packing and shipping center; and has manufactures of lumber, machinery, boilers, etc., and the railroad shops of the Hutchinson and Southern railroad. There are a public library, high school, State reformatory, electric lights, daily and weekly newspapers, a National bank, an assessed property valuation of $1,500,000. Pop. (1900) 9,376; (1910) 16,364.

Hutchinson, Anne, an American religious enthusiast; born in Lincolnshire, England, about 1590. Daughter of a Lincolnshire clergyman named Marbury; she married a Mr. Hutchinson, and in 1634 they emigrated to Boston, Mass. She held various theological heresies; among others, that the person of the Holy Ghost dwells in justified persons. She held meetings, lectured, and denounced the Massachusetts clergy. Her followers were charged with ANTINOMIANISM (*q. v.*). Being tried for heresy and sedition, she was banished from the colony. She and her friends removed to Rhode Island, where they acquired territory from the Narragansett Indians. After the death of her husband (who shared her opinions) she removed to a new settlement in New York State, where, in 1643, she and her whole family of 15 persons were taken prisoners by the Indians, and all but one daughter barbarously murdered.

Hutchinson, Ellen Mackay (MRS. ROYAL CORTISSOZ), an American journalist;

born in New York; was long one of the editors of the New York "Tribune," and was associated with E. C. Stedman in the compilation of the "Library of American Literature." Her numerous poems were collected under the title of "Songs and Lyrics" (1881).

Hutchinson, John, an English theological writer; born in Spennithorne, Yorkshire, England, in 1674. In 1724 he published the first part of a work called "Moses' Principia," in which he defended what he regarded as the Mosaic cosmogony, and assailed Newton's theory of gravitation. His religious system is best exhibited in his "Thoughts Concerning Religion." The leading principle of it is that the Holy Scriptures contain the elements not only of true religion, but of all rational philosophy. His followers were called Hutchinsonians, and among them were persons of considerable learning and celebrity. He died Aug. 28, 1737.

Hutchinson, John, an English revolutionist; born in Nottingham, England, in September, 1616. He was the son of Sir Thomas Hutchinson, and studied at Cambridge and Lincoln's Inn. He married, in 1638, Lucy, daughter of Sir Allan Apsley. He sided with the Parliament against the king. Becoming governor of Nottingham, he successfully held the town against enemies without and intrigue and calamity from within till the close of the struggle. In 1646 he entered Parliament, and later sat as one of the commissions in the High Court of Justice for the king's trial, and signed the warrant for his execution. He sat in the first council of state, but gradually became alarmed at the ambitious schemes of Cromwell, and ceased to take an active part in politics. At the Restoration, he was included in the Act of Amnesty, but later was imprisoned for about a year in the Tower and at Sandown Castle in Kent on a groundless suspicion of treasonable conspiracy, and died Sept. 11, 1664. The "Memoirs," written by his widow for her children, was first published in 1806, and revealed to the world a delightful picture of a finished Puritan gentleman.

Hutchinson, Thomas, an American colonial governor; born in Boston, Mass., Sept. 9, 1711; was graduated at Harvard College in 1727, and early attained prominence in the colonial affairs of Massachusetts. In 1770 he was appointed governor, but became unpopular during the conflict with Great Britain over the right to tax the colonies. In 1774 he was superseded by General Gage. He died in Brompton, England, June 3, 1780.

Hutten, Philip von (höt'ten), a German adventurer; cousin of Ulrich von Hutten; born in Birkenfeld, about the end of the 15th century. He was educated at the court of Henry of Nassau. In 1528 the Emperor Charles V. made a grant of the province of Venezuela to the Welsers, a firm of rich Augsburg merchants; and Hutten sailed with one of the companies they sent out. He accompanied the viceroy, Georg Hohemut, in a long journey (1536–1538), in which they reached the headwaters of the Rio Japura, near the equator. In 1541 he set out in search of the Golden City. After several years of wandering, harassed by the natives and weakened by hunger and fever, he and his followers came to a large city, the capital of the Omaguas, in the country N. of the Amazons; and attacking this place, they were routed by the Indians, and Hutten himself severely wounded. He led those of his followers who survived back to Coro in 1546, where Juan de Caravajal had in the meantime usurped the office of viceroy; and by him Hutten and his lieutenant, Bartel Welser, were seized and beheaded. Eight years later the Welsers' grant was taken from them, and the rule of the Germans in Venezuela came to an end. Hutten wrote "News From the Indies" (1765).

Hutten, Ulrich von, a German controversial satirist; born in Steckelburg, near Fulda, Prussia, April 21, 1488. Of a no-

ULRICH VON HUTTEN.

ble family and destined for the Church, he preferred a life of roving adventure. After many vicissitudes, including shipwreck, military service, and absolute beggary, he rose to fame by brilliant contributions to the current religious and political controversies. His works include: "The Art of Prosody"; "Nemo," a satire on the pedantic learning of his day; "Dialogues"; and various others, most of them attacking abuses in the Church. His most noteworthy production, however (his in part if not wholly), is the "Letters of Obscure Men"

(*i. e.*, of men who think and talk obscurely), mercilessly ridiculing the ignorance of the lower clergy. He died in the island of Ufenau, Lake Zurich, 1523.

Hutter, Leonard, a German Protestant theologian; born in Nellingen, near Ulm, in 1563. He was Professor of Theology at Wittemberg in 1596–1616. His "Compend of Theological Places" (1610) took the place of Melanchthon's "Places," and was long a popular work, as was also his "Concurrent Concord" (1614). He died in 1616.

Hutton, Charles, an English mathematician; born in Newcastle-upon-Tyne, England, Aug. 14, 1737. He was the son of a superintendent of mines, and seems to have worked for a short time in a colliery; but 1755–1773 was a teacher in schools at Jesmond and Newcastle. 1773 he was appointed to the professorship of mathematics at the Royal Military Academy, Woolwich, and in 1774 was elected a Fellow of the Royal Society. Soon after this he was selected to perform the necessary calculations for determining the density of the earth, and his report was published in the "Philosophical Transactions" for 1778. He resigned the professorship in 1807, retiring on a pension. He wrote: "Tables of Products and Powers of Numbers" (1781); "Mathematical Tables" (1785); "Mathematical and Philosophical Dictionary" (1795); "Course of Mathematics" (1798–1801); "Recreations in Mathematics and Natural Philosophy" (1803); etc. Besides these, he contributed mathematical papers to the "Philosophical Transactions," and had an important share in preparing an abridgment thereof (18 vols. 1809). He died Jan. 27, 1823.

Hutton, James, a Scotch geologist and natural philosopher; born in Edinburgh, Scotland, June 3, 1726. He studied medicine in his native city and at Paris and Leyden, but on his return home (1754) he settled in Berwickshire and devoted himself to agriculture and chemistry, from which he was led to mineralogy and geology. In 1768 he removed to Edinburgh, and there spent his time in scientific, especially physical investigations. The views most characteristically associated with his name were first made known in two papers read before the Royal Society of Edinburgh, "A Theory of the Earth" (1785); and "A Theory of Rain" (1784). The former was afterward expanded into two volumes, published in 1795. He also wrote "Dissertations in Natural Philosophy" (1792); "Considerations on the Nature of Coal and Culm" (1777); etc. He died in Edinburgh, Scotland, March 26, 1797. See HUTTONIAN THEORY.

Hutton, Laurence, an American editor; born in New York, Aug. 8, 1843. Devoting his earlier years to mercantile pursuits, he at length became dramatic critic of the New York "Evening Mail"; literary editor of "Harper's Magazine" (1886–1898). He wrote: "Plays and Players"; "Edwin Booth"; "Literary Landmarks"; etc.; and essays on London, Edinburgh, Jerusalem, Venice, Florence, and Rome. He made a remarkable collection of death masks of noted people, which he gave to Princeton University. He died June 10, 1904.

Hutton, Richard Holt, an English editor, critic, and author; born in 1826. He was editor of the London "Spectator," a literary critic of great repute, and the author of "Studies in Parliament: a Series of Sketches of Leading Politicians" (1866); "Essays, Theological and Literary" (2 vols. 1871); "Sir Walter Scott" (1878) in "English Men of Letters" series; "Essays on Some Modern Guides of English Thought in Matters of Faith" (1887). He died in 1897.

Huttonian Theory, in geology, the theory first published by Dr. James Hutton, in 1788, in his "Theory of the Earth," and developed in 1795. He was the first to distinguish between cosmogony and geology, believing the latter to be in no way concerned with "questions as to the origin of things." His view was that the upraised land of the globe must be worn away by atmospheric influences and the débris be finally deposited in the bed in the sea, where it is consolidated under great pressure; it is then forced upward by subterranean heat, acting with an expansive power, and thereby split and cracked, the fissures at the same time filling with molten mineral matter; and so the process goes on. Hutton was the precursor of Sir Charles Lyell, whose views were essentially the same, and who procured for them large acceptance among geologists. Professor Huxley called the Huttonian theory Uniformitarianism. See GEOLOGY: HUTTON, JAMES: PLUTONISTS: VULCANISTS.

Hut Urn, a name given to small cinerary urns of Etruscan pottery, which are in the form of rude huts of skins, stretched on cross-poles. They have been found on and near the Alban Mount, and are of very high antiquity, the sepulchral furniture of the earliest races of Italy, prior, it is probable, to the foundation of Rome.

Huxley, Thomas Henry, an English biologist and essayist; born in Ealing, England, May 4, 1825. He was graduated at London University in 1845. In 1846–1850 he sailed around the world as a naval surgeon. In 1851 he was made F. R. S. by the Royal Society; he became Professor of Natural History in the School of Mines in 1854; Hunterian Professor in the Royal College of Surgeons in 1863; president of the British Geological and Ethnological So-

cieties in 1869; secretary of the Royal Society in 1872; Lord Rector of Aberdeen University in 1872; and president of the Royal Society in 1883. He was an able advocate of Darwinian evolution, and was perhaps best known to the popular apprehension by his agnostic speculations, in expounding which he came into controversy with the defenders of Theism and Christianity. He wrote: "Anatomy of Vertebrate Animals"; "Anatomy of Invertebrate Animals"; "Man's Place in Nature"; "Lay Sermons"; "Evolution and Ethics"; etc. He died in Eastbourne, England, June 29, 1895.

THOMAS H. HUXLEY.

Huy (ü-ē′), a town of Belgium; on both banks of the Meuse, 19 miles S. W. of Liége. Its citadel (1822), whose works are partly excavated in the solid rock, commands the passage of the river. The Church of Notre Dame, a graceful Gothic edifice, was begun in 1311. In the vicinity are iron works and coal mines, and the manufactures include paper, leather, beer, spirits, etc. Peter the Hermit founded here the former abbey of Neufmoustier (*Novum Monasterium*), and here in 1115, he died. Huy has been frequently besieged. Pop. (1900) 14,644.

Huygenian Telescope, a telescope having an object glass of 123 feet of focal length. The glass was mounted on a pole, the only tube being a small one for the eye-glass. Hugens subsequently constructed an eye-piece of two lenses, which served the double purpose of enlarging the field of vision and diminishing aberration. See HUYGENS, CHRISTIAN.

Huygens, Christian (hoi′gens), an eminent Dutch mathematician and astronomer; born in The Hague, April 14, 1629. He settled in Paris in 1663, at the invitation of Colbert, who bestowed on him a handsome pension, but returned to the Netherlands in 1681. In pure geometry, Huygens gave the reasons for the quadrature of the hyperbola, the ellipsis, and the circle; in mechanics, he laid down the theory of the pendulum, and its application to the clock; he discerned the synchronism of the cycloid, invented the theory of involutes and evolutes of curves, and explored the doctrine of centers of oscillation; most important of all, he announced the law of the motion of bodies revolving in circles, thereby "grazing" the law of gravitation. In astronomy, we owe him an improvement of the telescope and the memorable discovery of Saturn's ring. In optics he laid the foundation of the theory of undulations. He died in The Hague, June 8, 1695.

Huygens, Constantyn, a Dutch poet and prose-writer; born in The Hague, Sept. 4, 1596. He was long private secretary to the Prince of Orange. His first volume of poems, "Otia" (Relaxations), is in Italian, French, Latin, and Dutch. The last two sections were subsequently enlarged and each published separately; the first as "Desultory Moments"; and the second, the widely read "Corn Flowers," which contained epigrams, translations, and one or two excellent comedies. His most notable poems are "Daily Toil," in memory of his wife, and "Batavian Temple," a series of native legends and scenes. His prose comprises memoirs, essays on music, and State papers. He is the most brilliant figure in Dutch literary history. He died March 28, 1687.

Huysmans, Jorris Karl (üēs-mo*ng′*), a French novelist; born in Paris, France, Feb. 5, 1848. He studied law and entered the French civil service, but abandoned it for literature. At first a pronounced realist, he turned to idealism and even mysticism. He first attracted notice by the story "Pack on Back"; then followed "Martha," "The Vatard Sisters," "The Ménage," and others. The latest expression of his theories was in "Down There" (Là-Bas), and "On

CHRISTIAN HUYGENS.

the Way" (1895). His style is dreamy and intensely delicate, but obscure at times.

Huyssenite (hī'sen-īt), a greenish-gray mineral from the salt mine of Strassfurt, often found in nodular forms that contain a nucleus of common salt. Sp. gr. 2.78. Composition: Borate of magnesia 40.36, borate of iron 50.05, chloride of magnesium 9.59. It becomes yellow on exposure.

Huysum, Jan Van (hī'zem), a Dutch painter; born in Amsterdam in 1682. His landscapes are conventional and artificial, but his fruit and flower pieces are exquisite. He died in 1749.

Hven, or **Hwen,** a small island of Sweden, on the S. W. coast in the Sound, 15 miles N. E. of Copenhagen. It was the residence of Tycho Brahe, and the place where he built an observatory, which has since fallen into decay.

Hwen-thsang, or **Hiouen-thsang** (whenth-sang), a Buddhist monk of China; born near Honan about 605. In 629 he set out on a pilgrimage to India, traveling by way of the Desert of Gobi, Tashkend, Samarcand, Bamian, and Peshawar. He remained in India a period of 13 years (631–644), visiting the sacred places connected with his religion, and studying its sacred books. He died in 664.

Hyacinth, in classical mythology, a Laconian youth, beloved by Apollo, who killed him undesignedly by a throw of a discus or quoit. The god transformed him into a flower (hyacinthus), on which, in memorial of his grief, he inscribed the Greek letters "alpha" and "iota." Scientifically viewed, the process should be reversed. The discovery of some plant with marks faintly resembling the Greek letters "alpha" and "iota" generated the myth of the youth Hyacinthus.

In botany, a genus of *Liliaceæ*, tribe *Scillcæ*, once so extensive as to include the common wild hyacinth (hyacinth of the woods) or blue-bell, then called *Hyacinthus nonscriptus*, next transferred to the genus *Agraphis* of Link, and called *Agraphis nutans*, and now figuring as *Scilla nutans*. It included also the present *Muscari racemosum*. As now limited its type is *H. orientalis*. The bulb is stout; the leaves fleshy, linear, and oblong; the inflorescence a drooping spike with the perianth bell-shaped, six-parted; the stamens six, all equal; one style, with a three-cornered stigma, and the ovary sub-globose, three-celled, many-seeded.

In mineralogy, a precious stone, described by Pliny as of the color of a hyacinth, and also like an amethyst, but not so blue. Dana regards it as having been a sapphire, some others consider it a kind of amethyst.

Hyacinthe, Père (yä-sant'), a French clergyman, the former monastic name of Charles Loyson; born in Orleans, March 10, 1827. He studied at St. Sulpice, and in 1851 becoming priest, taught philosophy and theology at Avignon and Nantes. Subsequently entering the order of the Carmelites, he became known as a powerful preacher, and gathered crowded and enthusiastic audiences of all ranks of society to the Madeleine and Notre Dame in Paris. Almost as remarkable as his eloquence was the boldness with which he denounced existing abuses in the Church; and Archbishop Darboy defended him against the accusations of the Jesuits till in 1869 the general of his order imposed silence on him. Hyacinthe replied by a letter in which he called for a thorough reform of the Church, and was excommunicated. Relieved from monastic vows by the Pope, he became a secular priest under the name of the Abbé Loyson. He protested vigorously against the infallibility dogma; but though he attended the "Old Catholic" Congress at Munich, and on visits to the United States and England fraternized with Protestants, he always declared his intention to remain in the Catholic Church, trying to obtain reforms, such as the liberty of marriage for the clergy. In 1872 he married an American lady. In 1873 he was chosen curé of a congregation of Liberal Catholics at Geneva, but soon left them. He has published sermons and lectures, and in 1879 established a "Gallican" congregation in Paris, which in 1884 attached itself to the Old Catholic Church in Holland.

Hyades (hī'ä-dēs), the five daughters of Atlas, King of Mauritania, who were so disconsolate at the death of their brother Hyas, killed by a wild boar, that they pined away and died. They became stars after death, and were placed near Taurus, one of the 12 signs of the zodiac. Their names are Phaola, Ambrosia, Eudora, Coronis, and Polyxus. To these some have added Thiene and Prodice. The ancients supposed that the rising and setting of the Hyades were always attended with much rain.

Hyæna, or **Hyena,** a genus of digitigrade carnivorous quadrupeds, included in the genus *Canis* by Linnæus, but now referred to the Æluroid division of the Carnivora, of which, however, it is a somewhat aberrant member, forming with *Proteles* a sub-family, *Hyænina*. Hyenas have six incisors and two canine teeth in each jaw, five molars on each side in the upper jaw, and four in the under. They seize an object with so firm a hold that, among the Arabs, they are proverbial for obstinacy. The vertebræ of the neck sometimes become ankylosed in old hyenas. The hind-quarters are lower and weaker than the fore-quarters of the body, so that hyenas move with a shambling gait. The body is covered

with rather long coarse hair, forming a mane along the neck and back. The feet have each four toes. The claws are strong, fit for digging, and not retractile. The tail is rather short. Beneath the anus is a deep glandular pouch, contributing much to the offensive odor by which hyenas are characterized. Hyenas eat carrion, as well as newly killed prey, and are of much use, like vultures, as scavengers, clearing away the last remnants of carcasses that if left to rot would greatly pollute the air. They sometimes attack cattle, especially if they flee, but rarely man, though they sometimes seize children. During the day they hide themselves in caves, old rock-tombs, ruined edifices, etc.; by night they roam singly or in packs in quest of prey. They prowl about towns and villages, and often dig up corpses that have not been very deeply buried. This, together with their aspect and manners, has caused them to be generally regarded with horror, and very exaggerated accounts of their fierceness have been prevalent. Instead of being untamable, as was long the popular belief, they are capable of being very completely tamed, and show an attachment to man similar to that of the dog; they have even been used as watch dogs. Hyenas are found only in Africa and the S. of Asia, not extending to the farthest E. of the latter continent. The striped hyena (*H. striata*) is found both in Asia and Africa, and there are several varieties considerably different in size, color, etc. The smallest hyenas are of the size of a large dog. The spotted hyena (*H. crocuta*) inhabits South Africa. It is rather smaller than the largest varieties of the striped hyena, but is more fierce and dangerous. It is called tiger-wolf by the colonists of the Cape of Good Hope. Besides its ordinary howling, which it emits very freely in its nocturnal roamings, this hyena often indulges in an expression of gratification or of some passion, resembling hysterical laughter, whence it has acquired the name of laughing hyena. The general color is ochry gray, with thinly scattered small round brown spots, and sooty muzzle and feet. The woolly hyena (*H. brunnea*) is a smaller South African species.

In consequence of the bones, which hyenas eat, their dung forms solid yellowish-white balls, of compact earthy fracture, the *Album græcum* of the old materia medica.

Hya-hya (hī″ä-hī″ä), a milky plant of South America.

Hyalea, or **Hyalæa,** the typical genus of the family *Hyalœidæ*. The shell is globular and translucent. The animal has long appendages to the mantle, which is slit at both sides. Nineteen recent species are known from the Atlantic, the Mediterranean, and the Indian Ocean. Five are fossil, the genus extending from the Miocene till now.

Hyalite, a glassy and transparent variety of opal, colorless or whitish. It is formed in globular concretions and crust; and is sometimes called from its discoverer Muller's glass.

Hyalonema, glass rope; the typical genus of the family *Hyalonemidæ*. *H. lusitanicum* is found in the Atlantic.

Hyatt, Nathaniel Irving, an American musical composer; born in Lansingburg, N. Y., April 23, 1865; was educated at the Troy High School and Lansingburg Academy; studied music in Germany in 1887–1891, and was graduated at the Leipsic Conservatory. He was Professor of Piano and Theory at the Syracuse University in 1896–1900; and became head of the music department of St. Agnes School, Albany, N. Y., in 1900. He composed numerous songs, choruses, piano music, etc.

Hybernidæ, a family of moths, group *Geometrina*. The antennæ of the male are pubescent or slightly pectinated; the abdomen is slender; the wings entire, rather broad. Female apterous or with the wings only rudimentary. Larva cylindrical, not humped.

Hybla (hib′lä or hī′blā), the name of three cities of ancient Sicily. (1) An old Siculian town situated on the S. slope of Mount Etna, which figured in the second Punic war; its site is fixed at the modern Paterno. (2) A city founded by the Megarians about 726 B. C., and probably identified with the city called Megara. It was destroyed by Gelon of Syracuse in 481 B. C. It is believed to have stood near the modern Agosta. (3) A third Hybla lay between Syracuse and Agrigentum. The Hyblæan honey, so much sung by Latin

Hyatt, Alpheus, an American scientist; born in Washington, D. C., April 5, 1838. He was graduated at Lawrence Scientific School, served with distinction in the Civil War, held professorships in leading scientific institutions, and was made curator of the Boston Society of Natural History and assistant in the Museum of Comparative Anatomy in Cambridge, Mass. He wrote "Fresh Water Polyzoa," "Genesis of Planobis at Steinheim," and numerous scientific treatises. He died Jan. 15, 1902.

Hyatt, John Wesley, an American inventor; born in Starkey, N. Y., Nov. 28, 1837; was educated in the common schools; became a printer and then an inventor. He perfected a composition billiard ball, a "bonsilene" compound, a water-purifying system, and a mode of dissolving pyroxylin. These patents are used throughout the United States and in other countries, being supplied from extensive works in Newark, N. J.

Hybrid, a mongrel produced, whether in plants or animals, by the impregnation of the female of one species, genus, or race, by the male belonging to a different family. The commonest sorts of hybrid are those which arise from the interconnection of different varieties of the same species; to notice which, the product of the wild boar and the domestic sow need only be mentioned. It is stated that specifical hybrids have been produced from the artificial fertilization, by Kölreuter, of the *Nicotiana rustica* with the pollen of *Nicotiana particulata;* and Schiek has demonstrated, by numerous observations, that a multitude of plants produce specifical hybrids in a state of nature. Among mammalia, however, though hybrids have been produced, they are not very common, though some have been obtained from the intermixture of the lion and tiger, the dog and wolf, and the horse and ass, the latter being extremely useful, and termed "the mule." Hybrids are generally sterile; and the intermixture of different species, according to Owen, is guarded against by the aversion of two specifically different individuals to sexual union. See BURBANK, LUTHER; PLANT-HYBRIDISM.

Hydaspes. See JHELUM.

Hydatid (hī'da-tid), a term applied to several distinct objects of a vesicular or cyst-like character, which are found in the bodies of men and certain mammals. True hydatids were formerly regarded as cystic Entozoa, such as *Cysticercus*, *Cœnurus*, and *Echinococcus*, but all these animal forms are now discovered to be larval stages of tænia or tapeworm. Hydatids may occur in almost any part of the body, and have been observed in man, the ape, the ox, the sheep, the horse, the camel, the pig, the kangaroo, and some other vegetable feeders, but they apparently do not occur in carnivorous animals or in the rodents. They are generally inclosed in an external sac, which is attached to the tissue of the organ in which it is situated, and which is frequently common to many hydatids, each of which has a distinct envelope.

Hyde, or **Hide,** a measure of land, frequently mentioned in Domesday Book and in old English charters, and variously estimated as equivalent to 60, 80, and 100 acres —a fact which may be accounted for on the supposition that the quantity was always determined by local usage. It was such a portion of land as might be plowed with one plow. The hyde at present is reckoned at 100 acres.

Hyde, a municipal borough and market town of England, in Cheshire; about 7 miles E. S. E. of Manchester, and 4½ N. E. of Stockport. The inhabitants are largely employed in cotton spinning and weaving, engineering and other works, the manufacture of hats, and coal-mining. Pop. (1901) 32,768.

Hyde, Douglas, an Irish historian, poet and folk-lorist; born in French Park, County Roscommon, in 1860. He was educated at Trinity College, Dublin, and graduated in 1884. He became interim professor of modern languages at the University of New Brunswick (Canada) in 1891, and subsequently was made Examiner in Celtic to the Royal University of Ireland. His reputation as a scholar grew rapidly, especially in the realm of Irish literature, after he had issued several collections of Gaelic songs and folk-tales. Under his pen-name, "An Craoibhin Aoibhinn," he is well-known among Irish-speaking people. A "Literary History of Ireland" (1899), written by him, is a notable production, inasmuch as it is the first worthy attempt at writing a systematic and comprehensive account of Gaelic literature. The popular movement for the preservation of the Irish language found in him a powerful leader, and he became president of the Gaelic League upon its foundation in 1893. He also became president of the Irish Texts Society, and in 1894-95 held that office in the Irish National Literary Society. Membership in the Royal Irish Academy was also conferred upon him. Besides being the author of numerous works of prose and poetry in the Irish tongue, he has written plays, poems, and histories in English. In 1906 he paid a visit to the United States in the interest of the Gaelic movement. See GAELIC IN THE UNITED STATES.

Hyde, Edward, a colonial governor of North Carolina; born in England about 1650. In 1710, when he was appointed governor, an insurrection, led by Thomas Cary, was in progress. Aided by Governor Spotswood of Virginia, Hyde succeeded in suppressing the revolt. He then turned to the defense of the colonists against the Indians, whom he resisted till his death. He died Aug. 8, 1712.

Hyde Park, a town of Massachusetts, in Norfolk co.; on the Neponset river, and on the New York, New Haven and Hartford railroad, 8 miles S. S. W. of Boston. The town is lighted by gas and electricity; has a public library, monthly, weekly, and daily periodicals, waterworks, and manufactures of cotton, curled hair, chemicals, machinery, paper, woolen and rubber goods; and contains the residences of many Boston business men. Pop. (1890) 10,193; (1900) 13,244; (1910) 15,507.

Hyde Park, a park in the West End of London, adjoining Kensington Gardens. It derived its name from having been the

manor of the Hyde belonging to the Abbey of Westminster, and contains nearly 400 acres. It abounds with fine trees and pleasing scenery. It became crown property on the dissolution of the monasteries in 1535; was surveyed, divided, and sold in 1652; and was resumed by the crown in 1660. It was soon afterward opened to the public. The sheet of water called the Serpentine river, though it has not the least resemblance to a river, was made between 1730 and 1733 by order of Queen Caroline. It is much frequented in summer for bathing, and during frosts for skating. At the E. end of it is an artificial waterfall constructed in 1817. On the S. side are the barracks of the Life Guards. The Crystal Palace of 1851 was erected on the S. side of Hyde Park. Political meetings are sometimes held in this park, and during the discussion of the Reform Bill of 1868 these meetings (held in defiance of the government) led to rioting and injury to property. Reviews are occasionally held in the open part of the park. It has at several times suffered curtailment, a large part of Kensington Gardens, as well as the site of Apsley House, having been taken from it.

Hyderabad. See HAIDARABAD.

Hyder Ali (hī-der äl'ē), an Indian prince of Arabian origin; born in Mysore about 1728. As commander of the forces of the Rajah of Mysore, he embraced the opportunity of getting supreme power and setting aside his sovereign. By a successful war with the British he obtained the promise of a defensive alliance, but their failure to assist him when his territory was invaded by the Mahrattas led to renewed war in which he invaded and ravaged British territory and nearly brought the presidency of Madras to ruin. His death occurred at a critical period in 1782, and he was succeeded by his son, Tippoo Sahib, who was driven from the Carnatic in 1783. Hyder Ali was one of the ablest of the Mohammedan princes of India, and encouraged agriculture, manufacture and trade.

Hydnora (hid-nō'rä), a genus of parasitic plants belonging to the order *Cytinaceæ*, which consists entirely of root-parasites. *Hydnora africana* is a South African species parasitic on the roots of fleshy *euphorbiæ* and other succulent plants; it has a putrid smell, but is roasted and eaten by the natives, and is also used for tanning.

Hydnum (hid'num), a genus of fungi belonging to the sub-order *Hymenomycetes*, order *Basidiomycetes*, and having the under side of the pileus covered with sofe spines which bear the spores. The species are numerous, some of them British; among these is *H. repandum*, more common in some parts of the continent of Europe, and much used as an esculent in France, Italy, and Germany. It grows chiefly in pine and oak woods.

Hydra, or **Idra,** an island of the Grecian archipelago, on the E. coast of the Morea, between the gulfs of Nauplia and Ægina; area, 20 square miles. Pop. 82,000.

Hydra (hī'drä), in classical mythology, a monster which infested the Lake Lerna in Peloponnesus. It was the offspring of Ichidna's union with Typhon. It had 100 heads, and as soon as one was cut off, two grew up if the wound was not stopped by fire. It was one of the labors of Hercules to destroy this monster; this he effected with the assistance of Iolaus, who applied a red-hot iron to the wound as soon as one head was cut off. The conqueror dipped his arrows in the gall of the hydra, and all the wounds which he gave proved incurable.

In astronomy, the hydra or watersnake, one of the 15 ancient Southern constellations. It is so long that it has been divided into four parts: (1) Hydra — *i. e.*, Hydra proper; (2) Hydra et Crater; (3) Hydra et Corvus; and (4) Hydræ continuatio. Hydra proper is a little S. of the bright star, Regulus, which is in Leo.

In zoölogy the typical genus of the family *Hydridæ*. The animal is locomotive, single, naked, gelatinous, sub-cylindrical, but very contractile and variable in form; the mouth surrounded by a single row of filiform tentacles. Propagation by the formation of gemmæ and ova upon or within the substance of the animal's body. If cut into pieces each will become a new hydra. If turned inside out the exterior surface will digest food and the interior one respire. Hydra was first described by Trembley in 1774. The genus contains the fresh water polypes. *Hydra viridis* has 6 to 10 tentacles, shorter than the body; it is leaf-green, and is found in ponds and still waters adhering to the roots of duckweed. *H. vulgaris* has 7 to 12 tentacles, at least as long as the body; it is orange, brown, yellow, or red. *H. attenuata* and *H. fusca* are rare.

Hydragogue (hī'drä-gog), an active purgative, causing a very large secretion of fluid from the mucous membrane of the bowels. Hydragogues cause relief by the partial emptying of the veins of the portal system. The chief hydragogues are gamboge, elaterium, and cream of tartar in large doses.

Hydrangea (hī-drān'jē-a), a genus of shrubs or herbs of the order *Saxifragaceæ*, containing about 33 species, natives of Asia and America. The garden hydrangea (*H. hortensis*) is a native of China, and was introduced into Great Britain by Banks in 1790. It is a favorite for the beauty and size of its flowers.

Hydrargyrum (hī-drar'gē-rum), in pharmacy, *hydrargyrum cum creta*, mercury

with chalk; also called gray powder. Obtained by rubbing one ounce of mercury with two ounces of prepared chalk till the globules are no longer visible. It is a light-gray powder, insoluble in water. It is one of the mildest preparations of mercury.

Hydrarthrus (hī-drar'thrus), a white swelling. The joints most subject to this

HYDRANGEA.

disease are the knee, ankle, elbow, and wrist. At first the swelling is slight, of the same color as the skin, but very painful, diminishing the mobility of the part affected. It can be distinguished from rheumatic swelling of the joints by its fixed and wearing pain, which often exists for a long time before any enlargement of the part is perceptible.

Hydrate, in chemistry, in combination with certain metallic oxides, water seems to play the part of an acid, forming a compound that may be considered as a pseudo-salt. Thus, with oxide of sodium water forms the compound $NaOH_2O$, or hydrate of soda, which is quite a different body to the simple NaO; in fact, such is the attraction existing between the two bodies that they cannot be separated by the strongest heat. The hydrated oxides of the heavy metals also differ in properties to the anhydrous oxides; sesquioxide of chromium, for instance, is not attacked by any of the acids, even with the aid of heat, but in the hydrated condition it is readily soluble in most of them. The combination of water with the oxides is always attended with the evolution of a large amount of heat; a familiar instance of which takes place in the slaking of lime. In the case of oxide of potassium and sodium, the action is so violent that the mass becomes incandescent.

Hydraulic Crane. The power originally employed to work cranes was manual labor exerted in turning the winch. But many

cranes are now connected with machines worked by steam or other agency, and their movements are controlled by the usual arrangement of levers required for such purposes; these levers are so placed that the man in charge of the crane has complete power over all the operations of hoisting, lowering, and stopping. An important improvement in the working of cranes, however, was effected by Lord Armstrong, through the employment of hydraulic pressure.

The mechanism may consist of one or more hydraulic presses, with a set of sheaves, used in the inverted order of blocks and pulleys, for the purpose of obtaining an extended motion in the chain from a comparatively short stroke of the piston. The accompanying plate exhibits a sectional elevation and plan of the hydraulic crane, and also a plan and elevation of one of the hydraulic presses employed, with sheaves attached to multiply the motion fourfold. The power is applied not only for lifting the load, but also for swinging the jib, which latter object is effected by means of a rack or chain operating on the base of the movable part of the crane, and connected either with a cylinder and piston having alternate motion, like that of a steam engine, or with two presses applied to produce the same effect by alternate action. The supply of water is derived from an apparatus termed the accumulator, which consists of a large cast iron cylinder, fitted with a plunger, from which a loaded weight case is suspended, to give pressure to the water injected by a steam engine. The load on the plunger is usually such as to produce a pressure in the cylinder equal to a column of 1,500 feet in elevation, and the apparatus is made sufficiently capacious to contain the largest quantity of water which can be drawn from it at once by the simultaneous action of all the hydraulic machines with which it is connected.

Whenever the engine pumps more water into the accumulator than passes direct to the hydraulic machines, the loaded plunger rises and makes room in the cylinder for the surplus; but when, on the other hand, the supply from the engine is less for the moment than the quantity required, the plunger with its load descends and makes up the deficiency out of store. The accumulator also serves as a regulator to the engine; for when the loaded plunger rises to a certain height, it begins to close a throttle valve in the steam pipe, so as gradually to reduce the speed of the engine till the descent of the plunger again calls for an increased production of power. The absence of any sensible elasticity in water renders the motions resulting from its pressure capable of the most perfect control, by means of the valves which regulate the inlet and outlet passages of the machines; but

this very property which gives so much certainty of action, tends to cause shocks and strains to the machinery by resisting the momentum acquired by the moving parts. Take the case of a hydraulic crane swinging around with a load suspended on the jib, the motion being produced by the water entering on one side of a piston and escaping from the other. Under such circumstances, if the water passages be suddenly closed by the regulating valve, it is obvious that the piston impelled forward by the momentum of the loaded jib, but met by an unyielding body of water deprived of outlet, would be brought to rest so abruptly as to cause in all probability, the breakage of the machine. So also in lowering a heavy weight with considerable velocity, if the escape passage be too suddenly closed, a similar risk of injury would arise from the abrupt stoppage of the weight if a remedy were not provided. These liabilities, however, are effectually removed by applying, in connection with the water passages to the cylinder, a small clack-valve, opening upward against the pressure into the supply pipe, so as to permit the pent up water in the cylinder to be pressed back into the pipe whenever it becomes exposed to a compressive force exceeding the pressures on the accumulator. See plate above referred to, which shows a slide-valve provided with relief clacks, and adapted for the turning apparatus of the hydraulic crane. Two of these relief clacks open against the pressure in the supply pipe, so as to afford an escape for the water, which would otherwise be shut up in the cylinder when the exhaust port closes, and the other two communicate with the discharge pipe, so as to draw in a portion of waste water to fill up the small vacancy which would otherwise be left in the cylinder on the closing of the admission port. By this means all jerks and concussions are avoided, and a perfect control over the movement of the machine is combined with great softness of action.

Hydraulic Engines, engines of which the motive power is water under pressure. In principle they do not differ essentially from steam engines. The water acts by difference of pressure — *i. e.*, it is admitted at a high pressure at the beginning of the stroke, and exhausted at a low pressure at the end of the stroke, thus giving a reciprocating motion to the plunger. They may also be rotary. As water is much more dense than steam, the induction and eduction pipes have to be larger and have no abrupt angles. The eduction valve is required to open promptly at the end of the stroke, and the induction valve must not close till the stroke is completed. Unless this is carefully adjusted injurious shocks or concussions called by the French "water-ram blows" result. In most of the hydraulic engines relief valves or other expedients are used to prevent these concussions. Since hydraulic engines work under much greater pressure they can be made much smaller than steam engines. A common form is the three-cylinder single acting engine; in each cylinder works a plunger; water is admitted by valves behind the plungers and forces them out; at the conclusion of the butstroke the pressure water-supply is cut off, and the exhaust valve opened, allowing the plunger to push the water out of the cylinder on the return stroke, and so on. There are two chambers in the framing, and one passage or port into the bottom of the cylinder; during the working of the engine the cylinder oscillates, and at the right time puts one or other of the two chambers in communication with the interior of the cylinder by means of this port; one chamber is open to exhaust pipe, the other to supply pipe. The plungers are connected to a three-throw crank. The great advantage of the single action is that shocks are avoided at the dead centers; the three cranks insure a very uniform turning force on the crank shaft, and also enable the engine to start in any position. Hydraulic engines have been introduced in some special industries, in large foundries, in the working of cranes and other heavy machinery, and also for draining of mines. A celebrated hydraulic engine of this kind is that used at Huelgoat in Brittany, where the piston rod, which is 250 meters or 767 feet long, and weighs 16,000 kilometers, about 16 tons, makes 5½ strokes a minute, and derives its power from a source 110 meters, 370 feet, above its own level. By ingenious and simple contrivances this machine regulates its own motion automatically, so that there are no perceptible shocks.

Hydraulic machines in a small form are used for many industrial purposes in the operating of printing presses, circular saws, lathes, etc. The water head is obtained from a reservoir or accumulator or, in cities where considerable pressure is constantly supplied, through the water mains. Hydraulic machines have great simplicity and compactness, and are not only economical while working but have no expenditures while at rest. WILLIAM M. COURTIS.

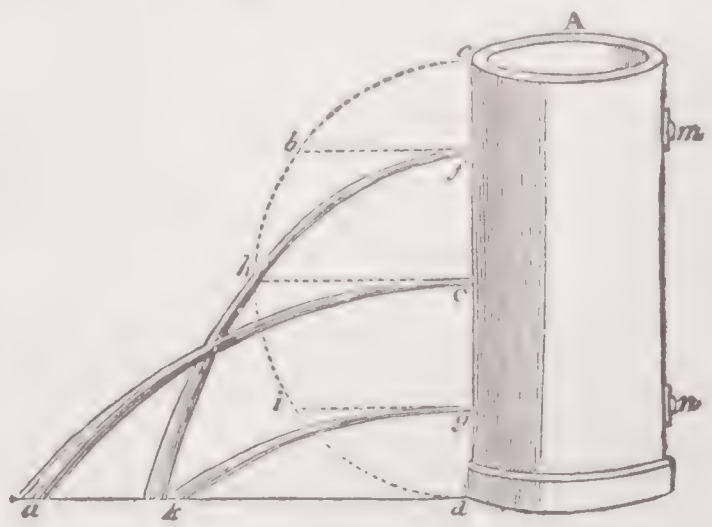
Hydraulics, the department of mechanical science which deals more especially with the flow of liquids in pipes and channels. One of the most important natural sources of energy is to be found in water which has been raised above the sea-level in the form of vapor by the sun's heat, and has fallen as rain or snow in elevated districts. On permitting the water to descend through a properly constructed channel a machine may be set in motion by the flowing water. Various kinds of engines or machines are employed to utilize the energy of the water

supplied to them; those in common use being water wheels and turbines. Tidal wheels have also been constructed for the purpose of employing the rising and falling tide as a source of power. They have not, however, been very successfully applied as yet. It is impossible to enter here in any detail into this technical branch of engineering science, and we must content ourselves with a brief account of some of the most common hydraulic machines.

The particles of fluids are found to flow over or among each other with less friction than over solid substances; and as each particle is under the influence of gravitation it follows that no quantity of homogeneous fluid having its surface free can be in a state of rest unless every part of the surface is level. As the particles of all liquids gravitate, any vessel containing a liquid will be drawn toward the earth with a force equal to the weight of the liquid it contains. The pressure at any point of a fluid at rest is simply proportional to the depth of that point below the free level — a circumstance of great importance in the construction of pumps and engines for raising water. As liquids gravitate independently, if a hole be made in the bottom of the vessel the liquid will flow out, those particles directly over the hole being discharged first. This motion causes a diminished upward pressure about the original position of the particles, and the surrounding particles tend to flow in from all directions; thus the whole mass of the water, and not merely the perpendicular column above the orifice, is set in motion. If the liquid falls freely its descent will be accelerated in the same manner as that of a falling solid body.

When water flows in a current, as in rivers, it is in consequence of the inclination of the channel, but all such motion is affected by the form of the channel and the friction of its sides. Experimental investigation has provided various coefficients whereby the resistance to the flow of water in pipes or channels can be calculated. As water in descending follows the same laws as other falling bodies its motion is accelerated; in rivers, therefore, we might perhaps expect to find the velocity and quantity discharged at different depths to be as the square roots of those depths; friction against the bottom, however, diminishes the rapidity of the flow. The law of the proportionality of the velocity of discharge to the square root of the depth applies, however, to the spouting of water through jets (as in the figure below). Thus if a hole be made in the side of a vessel of water, the water at this orifice, which before was only pressed by the simple weight of the perpendicular column above it, will be pressed by the same force as if the water were a solid body descending from the surface to the orifice, that is, as the square root of the distance of those two points; and in the same way water issuing from any other orifices will run in quantities and velocities proportional to the square root of their depths below the surface. Now the quantity of water spouting from any hole in a given time must be as the velocity with which it flows; if therefore a hole A be four times as deep below the surface as a hole B, it follows that A will discharge twice as much water in a given time as B, because two is the square root of four. A jet of water spouting from a hole in the side of the vessel half-way down will reach to the greatest horizontal distance (or range), which will be equal to the length of the column of which the orifice is the center. Jets of water spouting from holes at equal distances above and below the central orifice will be thrown equal horizontal distances, but not so far as in the former case. The path of the spouting liquid will always be a parabola.

To examine these questions experimentally let two pipes of equal size, *m* and *n*, be fixed into the side of the vessel A, but so that the pipe *n* is placed four times deeper below the surface *c* than the pipe *m*. (In this case the orifices *f* C *g* are supposed to be closed.) If the surface of the water in the vessel be kept at the same height by pouring a constant supply in, and if two vessels, one of which would hold a pint, be placed under the pipe *m*, and the other which would contain a quart under the pipe *n*, both vessels will be filled in the same time from their respective pipes. Thus the quantities of water passing through equal holes in the same time are as the square



roots of their depths. The horizontal distance to which a fluid will spout from a hole made in the side of an upright vessel may be determined in the following manner. Let the vessel A be filled with water to the height of the surface, and let *d k a* fall; on *c d* as a diameter describe a semicircle *c h d*; whose center C shall be the center of the height of the column of fluid in the reservoir A; then if holes be made in the reservoir at the points *f* C *g*, and lines

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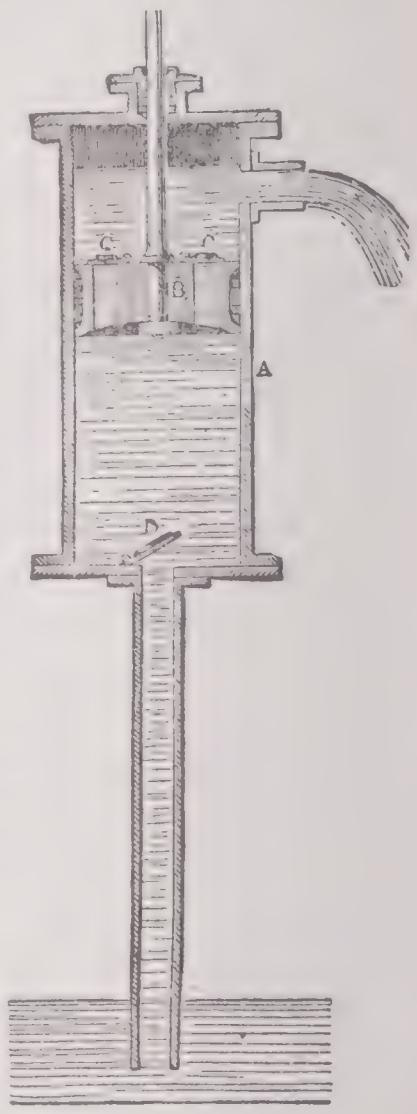
drawn from them to the semicircle perpendicular to the diameter of the semicircle, or the side of the vessel as at *f b*, c *h*, and *g i*: the distance to which water will spout from the holes *f* c *g* will be proportional to the length of line which cuts the semicircle. As c *h* is the longest line which can be drawn within the semicircle, the water spouting from c will reach the greatest horizontal distance *a*, and that range, if *in vacuo*, would be equal to twice the length of line drawn from the point of discharge to the semicircle. Though water will rise in pipes as high as the surface of the head from which it is supplied, yet in perpendicular jets it can never rise so high, because of the resistance of the air and the friction of the adjutage. The best kind of adjutage is the end of the tube covered with a thin plate, in which is made a smooth hole much less than the bore of the tube. With such an adjutage the water will ascend in a regular shape, and will meet with little friction in passing through the thin plate.

The machines that have been employed to raise water may be comprehended under four general heads: (1) Those machines in which water is lifted in vessels by the application of some mechanical force to them. The earlier hydraulic machines were constructed on this principle which is the simplest; such is the Persian wheel, which is merely a large vertical wheel having buckets attached to the rim, and moving in a reservoir of water. The buckets are filled at the bottom as they pass through the water, and emptied at the top, so that the water is raised a height equal to the diameter of the wheel. The wheel may be turned by animal power, or, if in running water, by fastening float-boards to the circumference. The sakieh, a modification of this machine in which earthen pots take the place of buckets, is in common use in Egypt. The common dredges for rivers and harbors are modifications of this kind of machine. The Archimedian screw, represented in fig. 3, with a modification of it, fig. 4, much used in Germany; the screw-pump, fig. 5, and the bucket engine or chain pump are all on the same principle. The chain pump is shown in fig. 2 of the plate: it usually consists of a succession of long links or metal rods revolving like an endless rope over two wheels, *e*, *f*, one of which, *f*, must be under water. On this chain, between each joint, is fixed a flat piece of wood or metal, *d d d*, usually square, which is supported and kept in its place by the projecting arms of the wheels *f* and *e*, though at the same time they are permitted to turn with the same freedom as the chain; the wheel *e* is turned by a winch which causes the whole chain to move, one side of it passing upward while the other side is continually descending in the same direction. The ascending side of the chain is made to pass through a box or pipe, one end of which is immersed in the water, the other end nearly reaching the upper wheel; this box corresponds in shape with the size of the plates, which fit pretty closely and form the pump. The succession of plates passing upward through the trunk forms a succession of cavities which are filled with water and are constantly discharged at the top. From the formation of this pump it will only work in deep water and consequently cannot drain a reservoir to the bottom; but it has the advantage of not becoming choked with sand or weeds. It is for these reasons frequently used in draining the water from the foundations of bridges, docks, and other large works. If the top and bottom wheels *e*, *f*, of this machine be retained, while the tube or trunk is taken away, and a number of small boxes or buckets be attached to the chain instead of the plates *d d d*, the machine then becomes a bucket engine, which is but another form of the Persian wheel already described. A pump on this principle is used in ships, and is called a chain pump.



(2) The next class of machines is that in which the water is raised by the pressure of the atmosphere, and comprises all those machines to which the name of pump is more particularly applied. These act entirely by removing the air from the surface of the water which may thus be raised to the height of about 32 feet. Whenever it becomes necessary to raise water to greater heights, the third class of machines, or those which act by pressure on the water, are employed. All pumps of this description are called forcing pumps.

The common suction pump consists of a hollow cylinder A, of wood or metal, which contains a piston B, stuffed so as to move up or down in the cylinder easily, and yet be air-tight: to this piston there is attached a rod which reaches at least to the top of the cylinder when the piston is at the bottom. In the piston there is a valve which opens upward (in the figure there are two

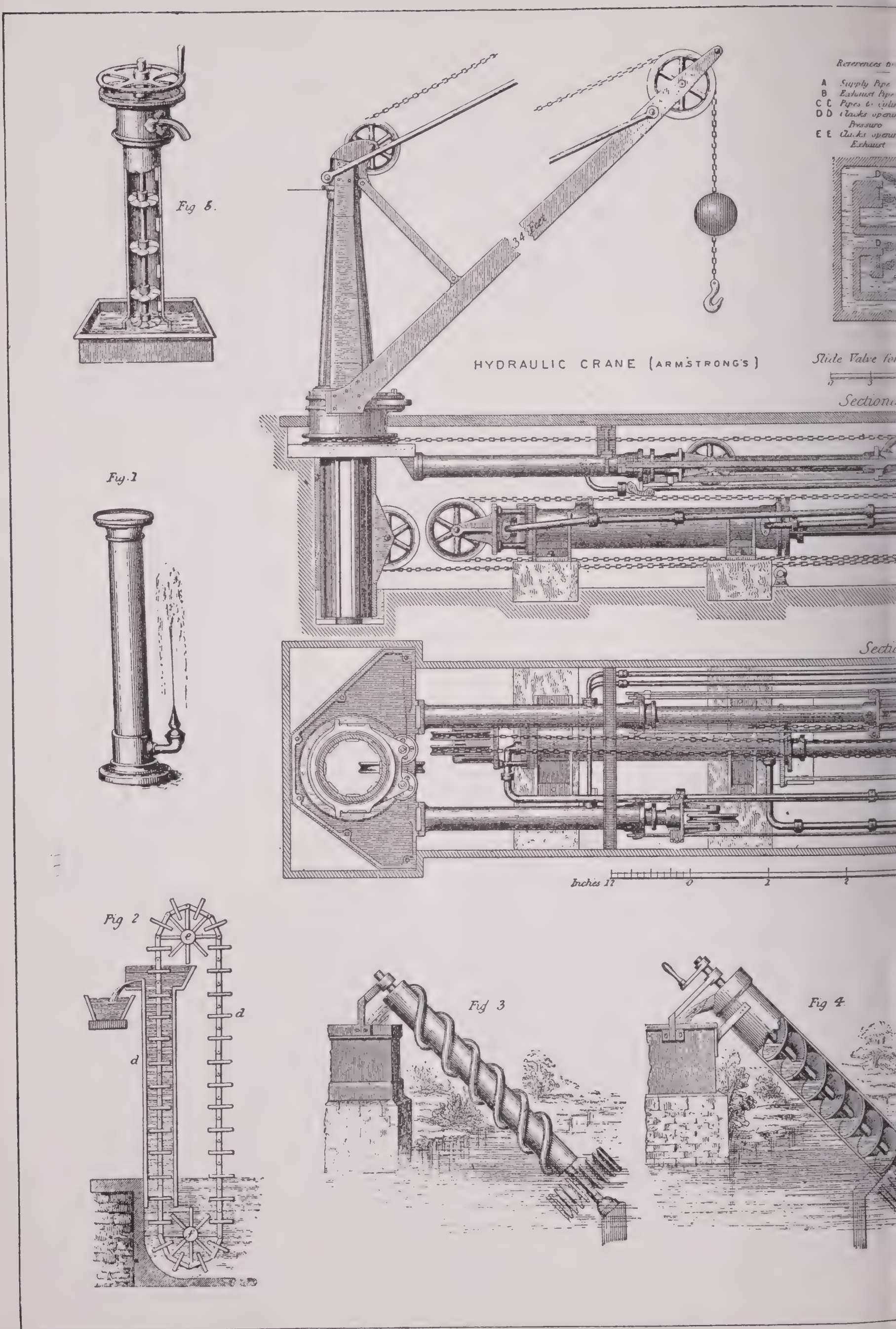
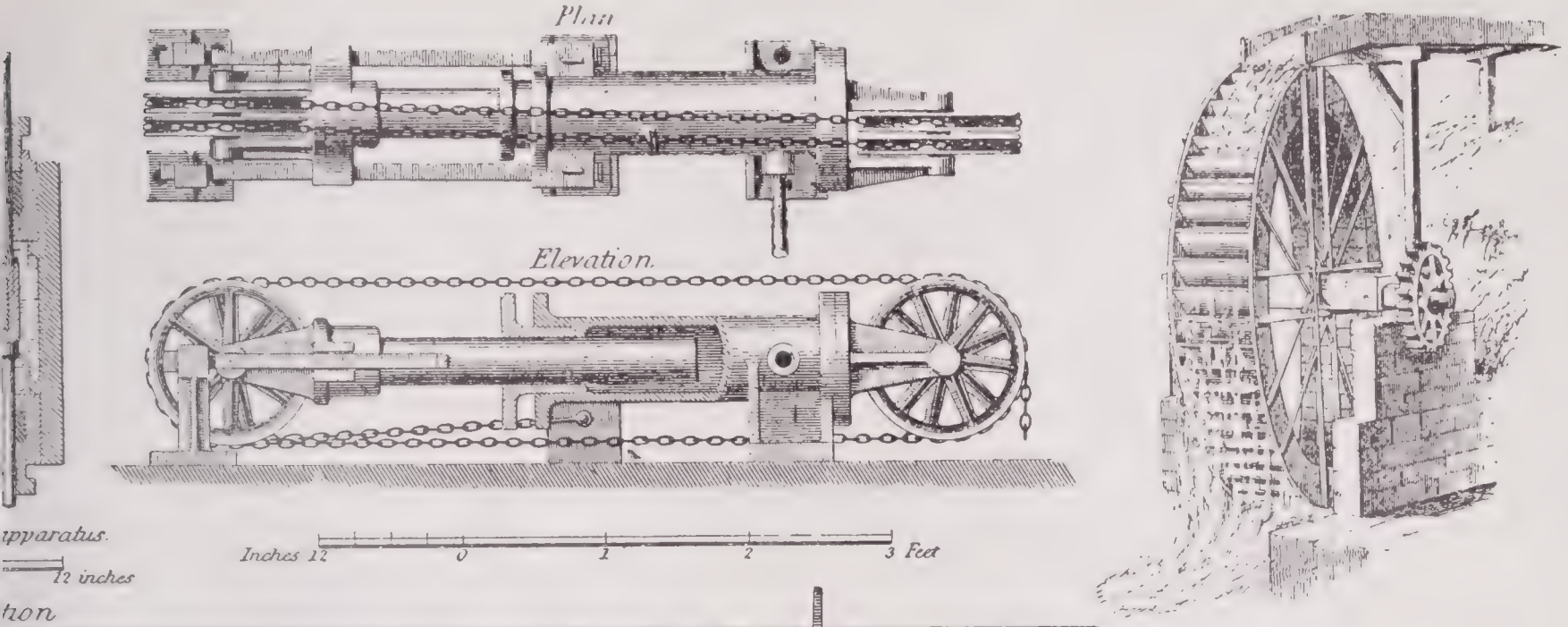


Fig 5.
Fig. 1
Fig 2
d
d
Fig 3
Fig 4
34 Feet
HYDRAULIC CRANE (ARMSTRONG'S)
Inches 12
0
1
2
A Supply Pipe
B Exhaust Pipe
Pressure
Exhaust
Slide Valve for

Hydraulic Press with sheaves, for Water Cranes, &c

Fig 9



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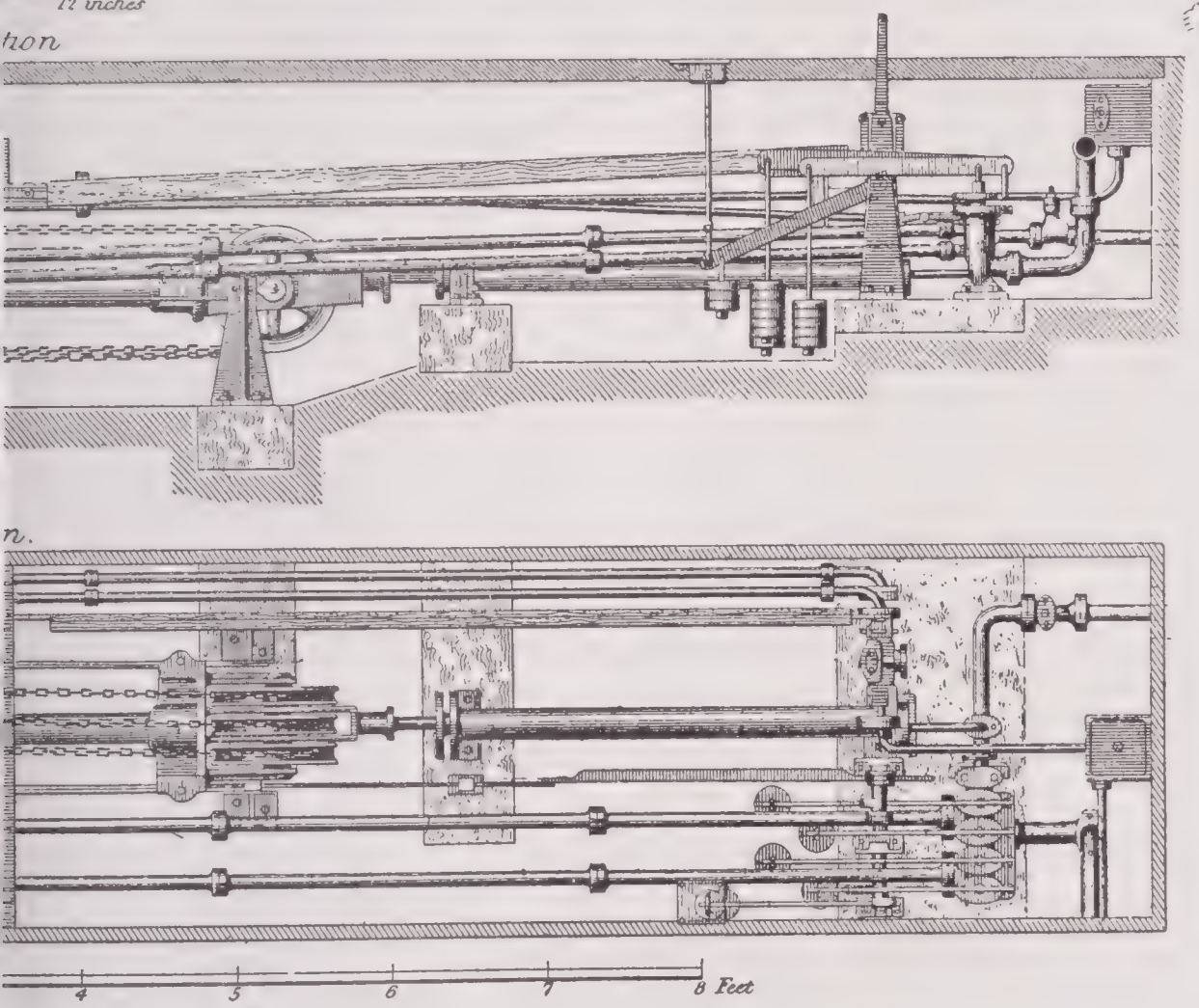


n.

Fig 10.

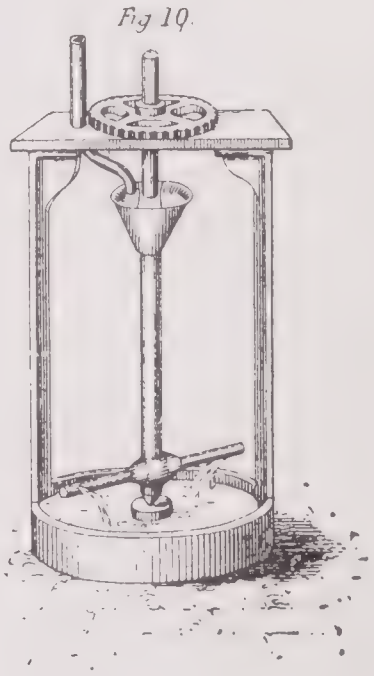


Fig 6

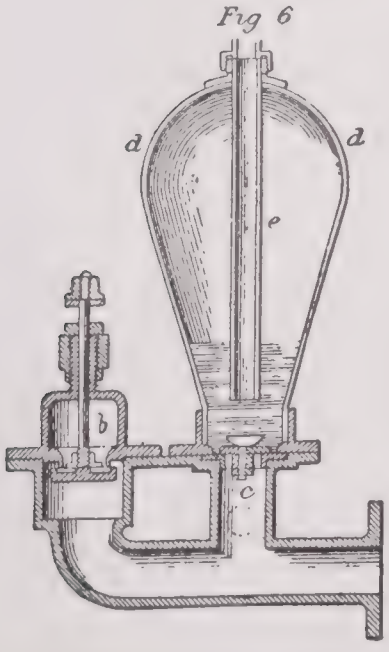


Fig 7

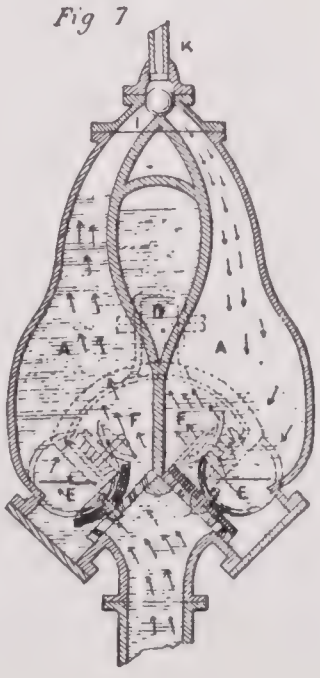
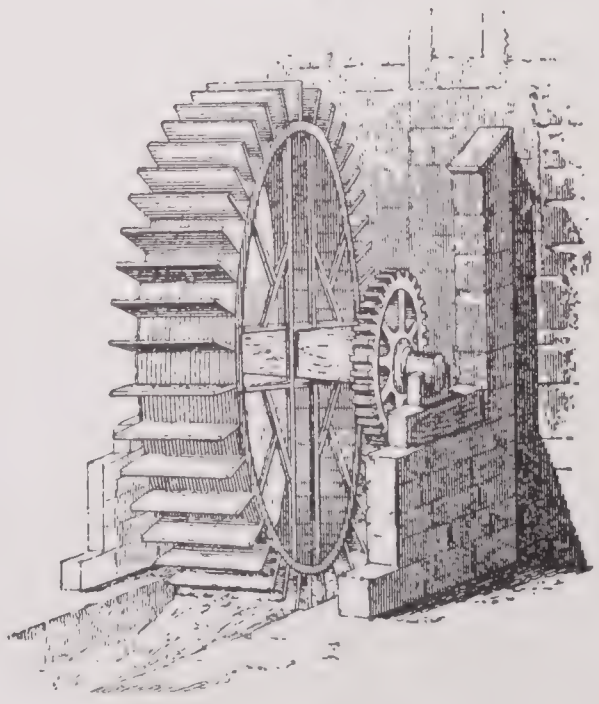


Fig 8

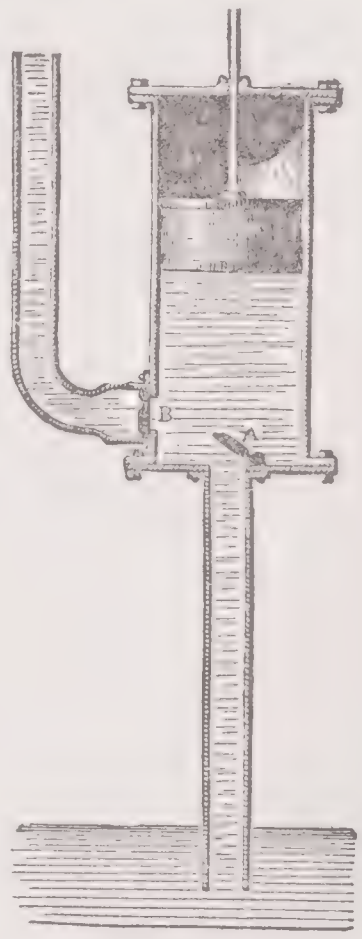


Hydraulics

valves C C), and at the bottom of the cylinder there is another valve D, also rising upward and which covers the orifice of a tube fixed to the bottom of the cylinder, and reaching to the well from whence the water is to be drawn. This tube is commonly called the suction tube, and the cylinder the body of the pump. When the piston is at the bottom of the cylinder there can be no air, or at least very little, between it and the valve D, for as the piston was pushed down the valve in it would allow the air to escape instead of being condensed, and when it is drawn up the pressure of the air would shut the valve, and there would be a vacuum produced in the body of the cylinder when the piston arrived at the top. But the air in the cylinder being very much rarefied, the pressure of the valve D on the water at the bottom will be greatly less than that of the external atmosphere on the surface of the water in the well; therefore the water will be pressed up the pump to a height not exceeding 32 feet. As the valves shut downward, the water is prevented from returning, and the same operation being repeated, the water may be raised to any height, not exceeding the above limit, in any quantity.

The quantity of water discharged in a given time is determined by considering that at each stroke of the piston a quantity is discharged equal to a cylinder whose base is the area of a cross section of the body of the pump, and height the play of the piston. Thus if the diameter of the cylinder of the pump be 4 inches, and the play of the piston 3 feet, then by mensuration we have to find the contents of a cylinder 4 inches in diameter and 3 feet high. Now 4 inches is the third of a foot or .333, hence $.333^2 \times .7854 = .11120 \times .7854 = .08733$ = the area of the cross section of the cylinder in square feet; hence $.08733 \times 3 = .26199$ = the contents of the cylinder in cubic feet = the quantity of cubic feet of water discharged by one stroke of the piston. Now 1 cubic foot of water weighs about 62.5 pounds avoirdupois, wherefore $.26199 \times 62.5 = 16.374$ pounds avoirdupois, and an imperial gallon is equal to 10 pounds of water; whence, dividing the above number 16.374 by 10, we get the number of gallons = 1.6374. The piston throughout its ascent has to overcome a resistance equal to the weight of a column of water having the same base as the area of the piston, and a height equal to the height of the water in the body of the pump above the water in the well.

The lifting pump, like the suction pump, has two valves and a piston, both opening upward; but the valve in the cylinder, instead of being placed at the bottom of the cylinder, is placed in the body of it, and at the height where the water is intended to be delivered. The bottom of the pump is thrust into the well a considerable way, and if the piston be supposed to be at the bottom it is plain that, as its valve opens upward, there will be no obstruction to the water rising in the cylinder to the height which it is in the well, for, by the principles of hydrostatics, water will always endeavor to come to a level. Now when the piston is drawn up the valve in it will shut, and the water in the cylinder will be lifted up, the valve in the barrel will be opened and the water will pass through it, and cannot return as the valve opens upward; another stroke of the piston repeats the same process and in this way the water is raised from the well; but the height to which it may be raised is not in this, as in the suction pump, limited to 32 feet. To ascertain the force necessary to work this pump, we are to consider that the piston lifts a column of water whose base is the area of the piston, and height the distance between the level of the water in the well and the spout at which the water is delivered.



(3) The forcing pump constitutes the third class. Though atmospheric pressure is not necessary in the construction of forcing pumps, it is, in most cases, resorted to for raising the water, in the first place, into the body of the pump where the forcing action takes place. In machines of this kind the water may be raised to any height. The piston of this pump has no valve, but there is a valve at the bottom of the cylinder as is shown at A. In the side of the cylinder and immediately above the valve A, there is another valve B opening outward into a tube, which is bent upward to the height at which the water is to be delivered. When the piston is raised the valve in the bottom of the pump opens, and a vacuum being produced, the water is pressed up into the pump on the principle of the suction pump. But when the piston is pressed down the valve A at the bottom shuts, and the valve B at the side which leads into the ejection pipe opens, and the water is forced up the tube. When the

piston is raised again the valve B shuts and valve A opens. The same process is repeated, and the water is thrown out at every descent of the piston; the discharge therefore is not constant. It is frequently required that the discharge from the pump should be continuous, and this is effected by fixing to the top of the eduction pipe an air vessel. This air vessel consists of a box, in the bottom of which there is a valve opening upward into the box. This valve covers the top of the eduction pipe. A tube is fastened into the top of the box, which reaches nearly to the bottom of the box; it rises out of the box, and is furnished with a stop-cock. If the stop-cock be shut, and the water be sent by the action of the pump into the air vessel, it cannot return because of the shutting of the valve at the bottom of the box; and because of the space occupied by the water, the air in the box is condensed, and will consequently exert a proportionate pressure on the water in the air vessel, and force it up through the tube E. The stream of water issuing will therefore be continuous, the pressure being continuous.

(4) The fourth class of hydraulic machines for raising water consists of such engines as act either by the weight of a portion of the water which they have to raise, or of any other water that can be used for such purpose, or by its centrifugal force, momentum, or other natural powers; and this class therefore includes some very beautiful and truly philosophical contrivances too numerous for us to describe. The centrifugal pump, and the water ram are among the number.

The centrifugal pump, much used in engineering operations, consists of a drum or wheel containing a series of curved vanes; this wheel is encased in a circularly shaped casing, gradually enlarging toward the outlet. The wheel with its vanes being rapidly rotated causes the water to be impelled outward into the casing and ultimately discharged from the outlet. This machine is very similar in form to the vortex wheel or turbine, afterward explained and illustrated, the direction of flow of the water being, however, in the reverse direction.

An ingenious form of pump called the pulsometer has been devised and extensively employed. In this case there are few working parts. From fig. 7 of the plate it will be seen that it consists essentially of a double chamber AA, having a ball valve I at top, and clack valves EE at bottom. Steam is admitted at K to one of the chambers and presses out the water contained there, through F to the pipe D. Condensation then taking place a vacuum is formed, and the ball falls over and closes the opening through which the steam entered, and water flows up through the clack valves and again fills the chamber. The steam in the meantime is now acting on the water contained in the adjoining chamber. Condensation then taking place there the ball falls back to that side, and the operations go on alternately, the result being a steady stream of water sucked into one chamber after another, and then forced out and upward by the steam pressure. The water is drawn into the machine from the center.

The hydraulic ram is a very ingenious and useful machine for raising water and depends for its action on the impulse or momentum of flowing water and the pressure of air. The machine consists essentially of a short pipe or chamber fitted with two valves and having placed over one of these valves an air vessel. (See the accompanying plate, fig. 6) *a* is the body of the ram, *b* and *c* the valves, and *d* the air vessel; *e* is a pipe rising inside the air vessel. Water is supplied to the body of the ram by a pipe coming from a reservoir at a small elevation above the ram, and part of this water is forced up through the pipe *e*, which may be carried to a considerable height above the source of supply. The rest of the water runs to waste through the valve *b*.

The action of the machine is as follows: The weight of the valve *b* causes it to fall downward (as shown by the dotted lines), and thus leaves an opening above it. The supply of water rushes through this opening, but in doing so presses against the valve *b*, which has a rounded face below. This, after a little, causes the valve to rise and close the opening. The water which previously was flowing through the body of the ram is now suddenly confined there, and by its pressure, due to momentum, opens the valve *c*, which may be of the clack form, and a quantity of water passes into the air vessel. The cessation of the outward flow and relief of internal pressure allow the valve *b* to fall again, and the clack valve *c* now closing, an outrush of water again takes place as before. The pressure of the flowing water on the valve *b* once more closes this valve, and the clack valve again opens and an additional quantity of water is forced into the air vessel, and so on, by a series of pulsations the action continues. The addition of water to the air vessel causes compression of the contained air, which, reacting on the water now inside this vessel, causes a portion of it to rise in the pipe *e* and ultimately to be delivered at the required height.

Various mechanical details have to be attended to so as to allow air to enter with the water in order to keep up the air supply in the air vessel, also to prevent too great shock when the valves open and close.

The efficiency (or ratio of useful work to total work) may be represented by $\frac{q\,H}{Q\,h}$,

Hydraulics

where q = quantity of water raised, and H = height to which this water is raised; Q = total quantity which enters the ram, and h the height or fall from the reservoir to the ram. In ordinary circumstances the value of the ratio $\frac{q\,H}{Q\,h}$ is equal to .6 or

$$q = \frac{.6\,Q\,h}{H}.$$

In some improved forms water from a different source than that which works the ram can be elevated. Thus the ram can be worked by water from a stream, while water drawn from a well can be raised.

We now come to the last part of our subject, the general consideration of water wheels and other contrivances for moving machinery. Motion is generally obtained from water either by exposing obstacles to the action of its current, as in water wheels, or by arresting its progress in movable buckets or receptacles which retain it during a part of its descent.

Water wheels may be divided into two classes, viz.: vertical and horizontal wheels. In the former we have three classes: (1) undershot wheels; (2) overshot wheels; and (3) breast wheels.

The undershot wheel is the oldest form: it is merely a wheel furnished with a series of plane surfaces or floats projecting from its circumference, for the purpose of receiving the impulse of the water delivered under the wheel, as shown in fig. 8. As it acts chiefly by the momentum of the water, the weight of the water being scarcely called into action, it is only proper to be used where there is a great supply of water always in motion. It is the cheapest of all water wheels, and is more applicable to rivers in their natural state than any other form of the wheel; it is also useful in tide currents, where the water sets in opposite directions at different times, because it receives the impulse equally well on either side of its floats. In the overshot wheel the circumference is furnished with a series of buckets, into which the water is delivered from above. (See fig. 9 of the plate.) The buckets on one side being erect, will be loaded with water, and the wheel will be thus set in motion; the mouths of the loaded buckets being thus turned downward by the revolution of the wheel, will be emptied, while the empty buckets are successively brought under the stream by the same motion and filled. The breast wheel differs from this in receiving the water a little below the level of the axle, and has floats instead of buckets. In improved forms of these wheels the floats are curved. In these two wheels the weight of the water is used as well as its momentum, and a much greater power is therefore produced with a less supply of water than is necessary for the undershot wheel. In order to permit these wheels to work with freedom and to the greatest advantage it is necessary that the back or tail water as it is called, or that which is discharged from the bottom of the wheel, should have an uninterrupted passage off; for otherwise it accumulates and forms a resistance to the float boards. One of the simplest methods of removing it consists of forming two drains through the masonry on each side of the water wheel, so as to permit a portion of the upper water to flow down into the tail in front of the wheel. The water thus brought down with great impetuosity drives the tail water before it, and forms a hollow place, in which the wheel works freely even if the state of the water be such that it would otherwise form a tailing of from 12 to 18 inches.

Turbines or horizontal water wheels are now much used for the driving of machinery, and are very suitable for high falls of water, as the action of such wheels depends on the impulse of the water and not on its direct weight as in the overshot wheel. Turbines have been divided into three classes, viz.: (1) parallel flow turbines, where the water is supplied and discharged

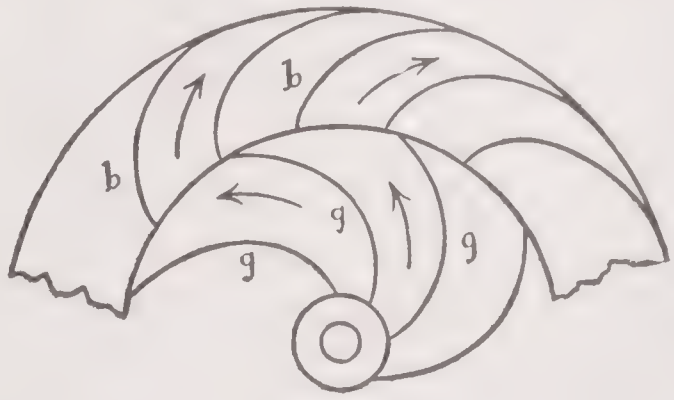


FIG. 1.

vertically; (2) outward flow turbines, where the water acts from the center outward; (3) inward flow turbines, where the water acts from the outside, the currents

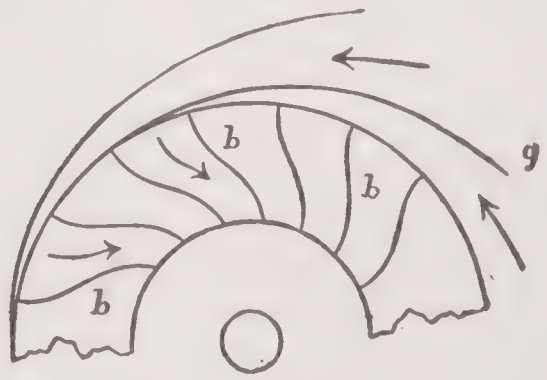


FIG. 2.

flowing inward toward the center. In all cases the greatest efficiency is obtained when the water acts on the blades of the wheel without causing a shock, and leaves the wheel without having any whirling motion. Different forms of turbine are now

in use all more or less based on the general arrangement as noted above, the objects of the inventors being to obtain the highest available efficiency. Figs. 1 and 2 show the forms of the blades and guides used, fig. 1 showing the arrangement for an outward flow turbine, and fig. 2 for an inward flow turbine, or vortex wheel as it is sometimes called. The arrows in each case show the motion of the water, *g g g* being the guide blades, and *b b b* the blades of the wheel. The water being directed by the guide blades, impinges on the wheel blades, and by its pressure while gliding over these causes the wheel to rotate.

In Barker's centrifugal mill, shown in fig. 10 of the plate, the water does not act as in the contrivances above noticed, by its weight or momentum, but by the reaction that is produced by the outflowing of the water on the point immediately behind the orifice of discharge. It consists of a revolving vertical tube, which receives the water at the top, and at the bottom of which is a horizontal tube, extending on each side of it, and having apertures opening in opposite directions near the ends. The water spouting from these apertures keeps up by its reaction a constant rotatory motion. The power is increased by lengthening the arms. W. M. COURTIS.

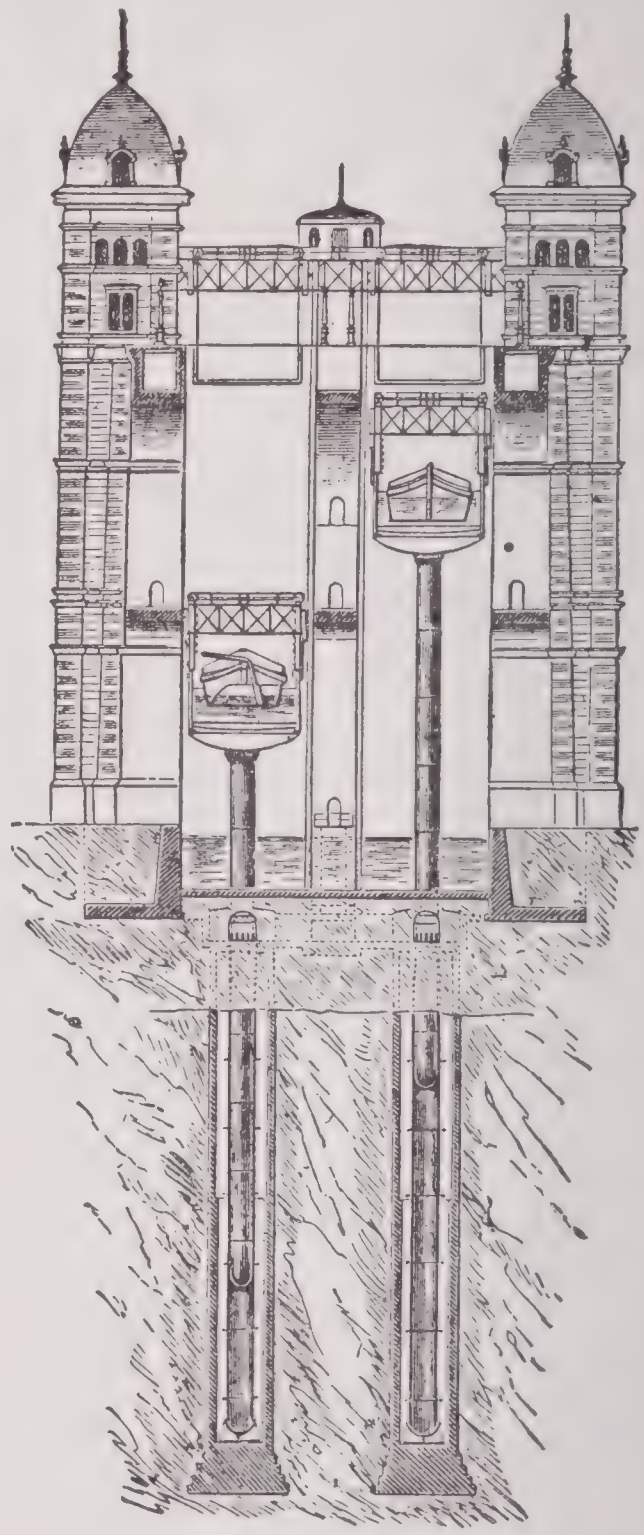
Hydraulic Lift, or **Elevator,** an apparatus on the principle of the hydraulic press, caused by means of a lever to draw up a chain which passes over sets of pulleys, and is thence conducted by leading pulleys over a jib. The weight is by this arrangement raised many times the stroke of the ram.

Hydraulic Mining, a system of mining in which the force of a jet of water is used to sluice down a bed of auriferous gravel or earth, which is passed through sluices to detain the particles of gold. See GOLD MINING.

Hydraulicon, or **Hydraulic Organ,** a form of organ formerly used, in which the pressure of the air was regulated by water; sometimes called hydraulic organ.

Hydraulic Press. See HYDROSTATIC PRESS.

Hydrazines (hī'drä-zīns), in chemistry, H_2N-NH_2. Hydrazine is not known in a free state. Its derivatives are obtained by the reduction of nitrosoamines by zinc dust and acetic acid, $(CH_3)_2N\cdot NO + 4H'$ (dimethyl-nitrosoamine $= (CH_3)_2N-NH_2 +$ HOH (dimethylhydrazine); also formed by the action of nascent hydrogen on nitrosodiethyl urea and diethyl hydrazine urea. This compound, boiled with concentrated HCl in a water-bath, gives $C_2H_5\cdot HN-NH_2 = HCl$, ethyl hydrazine hydrochlorate $+ C_2H_5HN_2\cdot HCl$ (ethylamine hydrochlorate) $+ CO_2$. They are strong bases. A primary hydrazine has only one H substituted by an alcohol radical, as $C_2H_5\cdot HN-NH_2$. They reduce Fehling's solution in the



HYDRAULIC LIFT OR ELEVATOR.

cold. A secondary hydrazine has two H's substituted by alcohol radicals, as $(CH_3)_2N-NH_2$. They only reduce Fehling's solution when warmed. Aromatic hydrazines are formed in the same manner. $C_2H_5N\cdot CH_3\cdot NO + 4H'$ (nitrosomethyl aniline) $=$ $HOH + C_6H_5\cdot CH_3\cdot N-NH_2$ (phenylmethyl hydrazine). An alcoholic solution of diazoamido-benzene reduced by zinc dust and acetic acid, yields $C_6H_5N=N-NH\cdot C_6H_5 + 4H = NH_2\cdot C_6H_5$ (aniline) $= C_6H_5HN-NH_2$ (phenyl hydrazine). Primary phenyl hydrazines are converted into diazo compounds by the action of mercuric oxide on their sulphates.

Hydrazobenzene (hī"drä-zō-ben"zēn), in chemistry, $C_{12}H_{12}N_2$, or $C_6H_5\cdot NH\cdot C_6H_5$,

an aromatic compound obtained by the action of H_2S on an alcoholic solution of azobenzene, $C_6H_5N=NC_6H_5$. Hydrazobenzene crystallizes in large plates, insoluble in water, but soluble in alcohol and ether. They melt at 131°.

Hydridæ, a family of serpents variously limited. As the name implies, the family consists of snakes living in the water but it is sometimes restricted to sea serpents of a venomous kind. The tail is compressed, belly keeled, head and eye small, nasal shield large, color yellowish green variegated with rings and spots; found in the Indian Ocean, China Sea, etc.

Hydriodic Acid, in chemistry, hydric iodide, hydrogen iodide, HI. Hydriodic acid is a colorless gas forming in the air. At a pressure of four atmospheres at 0° it is condensed to a liquid. It can be frozen at ordinary temperature by a mixture of ether and solid CO_2 at a temperature of 55°. Its sp. gr. is 4.3737, air = 1. Hydriodic acid is prepared by the action of phosphorus and iodine in the presence of water, $P + 5I + 4H_2 = 5HI + H_3PO_4$. One part, by weight, of amorphous phosphorus is placed in 15 parts of water, and 20 parts of iodine are added gradually. Then the flask is gently warmed, and the HI collected over mercury. H_2SO_4 does not liberate HI from potassium iodide; the reaction is $3H_2SO_4 + 2KI = 2KHSO_4 = I_2 + SO_2 + 2H_2O$. Hydriodic acid is not combustible, and will not support combustion. It is decomposed by passing it through a red-hot tube, the gas becoming violet-colored. HI is very soluble in water. A solution kept cold by ice will have a density of 1.990. The solution decomposes in the air, water being formed and iodine liberated, which redissolves in the solution, turning it dark colored. A solution of HI in water dissolves Zn, iron ore, with evolution of H, forming iodides. An aqueous solution of HI can be formed by passing H_2S through water in which iodine is suspended, $H_2O + H_2S + I_2 = 2HI + S + H_2O$. A solution having the density of 0.7 can be prepared in this manner.

Hydriodic Ether, or **Iodide of Ethyl,** a colorless uninflammable liquid composed of iodine and ethyl, of a sharp, pungent taste, and a penetrating ethereal odor; sp. gr. 1.94; boiling point 148° F.; sp. gr. of vapor 5.4. Formula C_4H_5I. At a red heat it is decomposed, giving off the purple vapors which are peculiar to iodine. When exposed to the action of the atmosphere for any length of time, it assumes reddish tints from the liberation of iodine, a change which may be easily prevented by introducing a globule of metallic quicksilver into the bottle containing it. It is nearly insoluble in water, but very soluble in alcohol, from a solution in which it is precipitated by the addition of water. It is also easily soluble in simple ether. When placed in contact with metallic zinc, the latter unites with the iodine, forming iodide of zinc, and leaving the radical ethyl, in the form of a colorless gas, having a faint, ethereal odor, of a sp. gr. of a little more than 2, and burning with a brilliant white flame. At the temperature of 37°, and under a pressure of 2¼ atmospheres, it is reduced to a colorless, transparent liquid, which is soluble in alcohol. The isolation of this radical requires a temperature of a little more than 300°. Common ether is the protoxide of this compound, represented by the formula C_4H_5O, and alcohol is the same when hydrated, $C_4H_6O_2$. Besides its use in the chemical laboratory as a reagent, it has within the past few years attracted the attention of physicians, especially in the United States and England, as a remedial agent, to be administered by inhalation, in many cases in which the use of iodine is indicated. It is given in doses of 12 or 15 drops, inhaled from a napkin or sponge. In these doses, it is a gentle stimulant, and anti-spasmodic, but in larger quantities, and when inhaled for a considerable time, it becomes a powerful anæsthetic agent. It is said to be especially adapted to diseases of the lungs and bronchial tubes, and hence it has been most successfully administered in cases of bronchitis, phthisis, asthma, catarrh, and their kindred diseases. It increases the appetite, produces an increased pulse, and is said to produce great vivacity of spirits, and activity of thought. When prepared with phosphorus, as by the first formula, it is sometimes nauseating to the patient, on account of remaining traces of that substance, but when prepared by the other method, and of pure materials, it is free from any such objection, as any excess of chlorine would be completely expelled by the degree of heat which is necessary for distillation. The alcohol employed in its preparation should be of the purest quality and especially should it be thoroughly deprived of all traces of fusel oil, as is also indispensable in the manufacture of chloroform.

Hydrocarbon, a name given to compounds of one or more atoms of carbon, with atoms of hydrogen. Carbon is a tetrad element, capable of uniting with four atoms of H, as CH_4 methane. But carbon atoms can unite with each other, by one or more pair of bonds. Hydrocarbons having the C atoms united by only one pair of bonds are called paraffins, $Cn:H_2n + {}_2:$, as ethane. Hydrocarbons having two C atoms united by two pairs of bonds are called olefines $Cn H_2n\cdot$, as ethene. By three pairs of bonds, are called acetylenes $CnH_2n\text{-}_2$ as acetylene. Besides these there are hydrocarbons belonging to the aromatic series, hav-

ing the carbon atoms arranged to form a closed ring, as BENZENE C_6H_6 (*q. v.*), and the napthalene series containing two closed rings. The constitution of the other groups of hydrocarbons is described under their respective names.

Hydrocele (hī′drō-sēl), a collection of serous fluid in some of the coverings of the testicle or spermatic cord, or in the areolar texture of the scrotum. It is generally the result of a strain or an inflammation of the testes. A large tumor is formed, filled with fluid, which has often to be drawn off three or four times a year. A radical cure may be effected by setting up an inflammation which brings the opposite surfaces of the sac into adhesion, and thus obliterates the cavity.

Hydrocephalus, a form of dropsy in the ventricles of the brain, or in the arachnoid cavity, in children, and usually rapidly fatal, though cases have been known to go on to adult life.

Hydrochloric Acid, (HCl), a gaseous compound of equal volumes of hydrogen and chlorine. It is evolved during volcanic eruptions, and is found in the water which collects in the crevices of mountains, as well as in rivers which take their rise in volcanic formations, especially in South America. It may be produced by decomposing common salt with sulphuric acid ($2NaCl + H_2SO_4 = 2H \cdot Cl + Na_2SO_4$), or by bringing equal volumes of chlorine and hydrogen together and exposing the mixture to diffused daylight with condensation, as it explodes in direct sunlight. Till recently the acid has been manufactured exclusively by the first of these methods as by-product in the Leblanc soda process. Since the introduction of the Solvay soda process other methods of making the acid were tried; at present it is made in Germany exclusively by heating carnallite, a Stassfurt mineral, consisting of magnesium chloride; when heated this breaks down with its water of crystallization yielding hydrochloric acid and magnesium oxide. $MgCl_2 + H_2O = MgO + 2HCl$.

Hydrochloric acid is colorless, has a pungent odor, and an acid taste. It colors moist litmus paper red. It is quite irrespirable, extinguishes flame, and dissolves very readily in water. When absorbed by warm water the solution is called muriatic acid. It is a smoking pungent fluid of sp. gr. 1.2, and combines powerfully with many chemical substances. That which is sold by apothecaries contains 25 per cent. of hydrochloric acid, and has a sp. gr. of 1.124. The chief use of hydrochloric acid is to supply chlorine to the bleaching-powder manufacturer. It is also used in the preparation of glass, sugar, alizarin, salicylic acid, ammonia, glue phosphorus, carbonic acid, artificial waters, and the resolution of the metals. It is present in small quantity in the human stomach, when it assists in the digestive process.

In medicine it is taken diluted as a tonic and astringent. In a concentrated form it is a powerful caustic. E. RENOUF.

Hydrochœrus (hī-drō-ker′us), a genus of rodent animals, family *Hystricidæ*, characterized by large size, four toes before and three behind, and all armed with large nails and united by membranes. The Capybara (*H. capybara*, Cuv.), of South America, is the largest known rodent, being three feet long and exceedingly bulky. Its muzzle is thick, limbs short, hair coarse, and tail almost wholly wanting, and the general color yellowish-brown. It is aquatic in its habits, is hunted as game, and its flesh is quite good for food.

Hydrocyanic Acid, cyanide of hydrogen, hydric cyanide, hydrogen cyanide, prussic acid. Discovered by Scheele in 1782. The pure anhydrous hydrocyanic acid can be prepared by passing dry H_2S over dry mercuric cyanide, gently heated in a glass tube connected with a small receiver cooled by a freezing mixture. It is a liquid which boils at 26.5°, and freezes at 15°. It is very poisonous, and smells like bitter almond oil. It easily decomposes. Heated with alkalies or acids it is converted into formic acid and ammonia. By the action of nascent hydrogen from zinc and hydrochloric acid it is converted into methylamine. An aqueous solution of HCN′ is best obtained by distilling powdered ferrocyanide of potassium with dilute sulphuric acid; a white residue of potassiumferrous ferrocyanide mixed with potassum sulphate remains in the retort. $2K_4Fe(CN)_6 + 3H_2SO_4 = 6HCN + 3K_2SO_4 + FeK_2FeCN_6$. When the leaves of the cherry laurel, bitter almonds, the kernels of peaches and cherries, are distilled with water, the distillate contains hydrocyanic acid. When a series of strong induction sparks are passed through a mixture of acetylene C_2H_2 and nitrogen, hydrocyanic acid is formed. Hydrocyanic acid is a weak acid, and forms salts called cyanides. Dilute acid is used to allay spasm. The dilute acid of the pharmacopœia contains 2 per cent. of HCN. Scheele's prussic acid contains 4 per cent. anhydrous. Hydrocyanic acid is the most rapid poison known; it causes death in a few seconds. The strength of a solution of HCN is determined by adding a solution of silver nitrate of known strength to a given volume of the HCN solution, to which excess of caustic soda has been added. The precipitate of AgCN is redissolved, on being well stirred, till all the hydrocyanic acid has been converted into a double salt of $NaCN \cdot AgCN$; afterward a precipitate of AgOH is thrown

down, which does not redissolve. Each molecule of $AgNO_3$ represents two molecules of HCN.

Hydrocycle, a water bicycle, constructed on the principle of a catamaran. The lower part of the machine consists of two long cylinders, made of galvanized iron, pointed at each end and held in position, side by side, about four feet apart, by strong steel rods. These cylinders are air-tight and built in several compartments. At the stern of the two cylinders are two small rudders of steel, operated by the rider of the hydrocycle by means of two rudder chains, which are connected with the steering gear. About one-third of the space between the cylinders is covered with a zinc flooring and on this is a seat resembling a light wooden chair on which the passenger rides.

Hydrodynamics, a department of science which treats of the nature of liquids, as opposed to hydrostatics, which investigates the condition of their equilibrium when at rest. It specially investigates, by observation, experiment, or the higher mathematics, the motion of liquids through orifices, in tubes, or that of water in canals, rivers, etc. Its principles are carried out in hydraulics, in which it was formerly merged. One of the first to study the motion of water in rivers and canals was Guglielmini, in 1691.

Hydro-electric Machine, a mechanism in which electricity is generated by the friction of steam against the sides of orifices through which it is allowed to escape under high pressure.

Hydrofluoric Acid, hydrogen fluoride, fluoride of hydrogen, hydric fluoride, HF. The anhydrous acid is obtained by neutralizing in a platinum dish the aqueous solution of hydrofluoric acid with caustic potash, and evaporating the solution. The salt, KF, crystallizes in cubes; when dissolved in water and evaporated quadratic tables of an acid, fluoride $KF \cdot HF$, crystallize out; these, when perfectly dry, are heated to redness in a platinum tube, and decomposed into $KFHF = KF + HF$. The anhydrous HF is an extremely dangerous substance; its vapor is very poisonous, and produces painful sores when it comes in contact with the skin. It is a colorless liquid which boils at 19.4°. If free from moisture it does not attack glass. Its vapor density is 10, that of hydrogen being 1, showing that it contains one volume of fluorine and one volume of hydrogen in two volumes of hydrofluoric acid. It chars organic matter, and explodes when mixed with turpentine. It has a very great affinity for water, combining with a hissing noise. The hydrated acid is prepared by acting on fluorspar, CaF_2, with concentrated sulphuric acid in lead or platinum vessels. It is heated, and the vapor condensed by a freezing mixture, or, if required dilute, is passed into water. It dissolves most metals except platinum, gold, silver, and lead. It can be kept in gutta-percha bottles. It attacks silicates and etches glass. It is detected by powdering the mineral, and placing it in a small lead dish, and adding concentrated sulphuric acid; the vessel is then covered with a plate of glass, which is coated with wax on the under side, on which letters are written by removing some of the wax. On heating the vessel the hydrofluoric acid is liberated, and attacks the glass where the wax has been removed.

Hydrogen, a monatomic metallic element, which exists in the state of gas. Symbol H; at. wt., 1; density, 0.06927; air being 1; weight of a liter of hydrogen, 0.0896 grammes, called a crith. Hydrogen can be obtained by the electrolysis of water, H_2O, the H being liberated at the platinum pole; by the action of metallic sodium and water; also by passing steam over iron filings, $3Fe + 4HOH = Fe_3O_4 + 8H'$; by boiling zinc with caustic potash, $2KHO + Zn = K_2 ZnO_2 + 2H'$; but H is generally made by the action of dilute H_2SO_4 on zinc. Hydrogen can be purified by passing it through a solution of two parts of $K_2Cr_2O_7$ in 20 parts of water and one part of H_2SO_4, then washing it with KHO, and drying it by passing it through concentrated H_2SO_4. The apparatus should be airtight and the gas rejected till the air is all displaced by hydrogen. Hydrogen is absorbed by red-hot iron and platinum; palladium absorbs 935 times its volume of hydrogen; about seven liters of gas are condensed into the space 1 c. c. Graham called this an alloy of hydrogenium, a metal having the sp. gr. of 0·62 and magnetic properties. Hydrogen has been found occluded in meteoric iron, and is contained in the gases given off by volcanoes. The spectroscope shows that a large quantity of free hydrogen exists around the sun. The spectrum of hydrogen contains four bright lines, a red arc corresponding to C, and a greenish-blue to F in the solar spectrum, and a blue and indigo line. Hydrogen has been condensed by Pictet, of Geneva, at a temperature of − 140°, and at a pressure of 650 atmospheres. When the pressure is removed the hydrogen is evolved in a jet of a steel-blue color. Pure hydrogen is a colorless, inodorous, tasteless gas; it is inflammable mixed with oxygen; it explodes in contact with a flame, or when the electric spark is passed through it, forming water. The calorific power of H is 34,462 thermal units. Hydrogen gas cannot support life, but it is not poisonous; it is slightly soluble in water. Hydrogen when

kept in a bag for a long time is dangerous, owing to diffusion. One volume of hydrogen mixed with 2.5 volumes of air gives the loudest detonation. Hydrogen in the nascent state is used as a reducing agent in chemistry.

Hydrogen in small quantities was reduced to a liquid by the French chemists, Cailletet and Pictet, in 1877–1878; and in May, 1898, Prof. James Dewar, of the Royal Institution, London, succeeded in liquefying it in quantity by means of extreme coldness produced by liquid air. Liquid hydrogen is clear and colorless, and shows no absorption spectrum. Its latent heat is about two-fifths that of liquid oxygen. Static hydrogen boils at a temperature of 238° C. at ordinary pressure, and 250° C. in a vacuum, thus enabling us to get within 23° of absolute zero. The density of liquid hydrogen is only one-fourteenth that of water.

Hydrogen Dioxide, hydrogen peroxide, H_2O_2, or HO — OH. Obtained by the action of dilute sulphuric acid and barium peroxide, BaO_2. The barium peroxide is added gradually to a mixture of one part of H_2SO_4 and five parts of water till the solution is only slightly acid, the $BaSO_4$ is allowed to settle, and the clear liquid is concentrated by evaporation in vacuo. It can be obtained as a colorless oily liquid; it is decomposed by alkalies; it blisters the skin and bleaches litmus. At 60° F. it gives off oxygen and bubbles; when boiled, oxygen is liberated so rapidly that it sometimes explodes. It is very soluble in ether. Finely divided gold, silver, and platinum decompose H_2O_2 into water and oxygen; oxides of gold and silver are reduced to the metallic state $Ag_2O + H_2O_2 = 2Ag + H_2O + O_2$. If a solution of H_2O_2 be acidified with H_2SO_4, and ether and potassium chromate be added, the ethereal solution turns blue on being well shaken, owing to the formation of perchromic acid. Hydrogen dioxide liberates iodine from KI in the presence of $FeSO_4$. A dilute solution of hydrogen dioxide is used to clean stained engravings, and also to bleach dark-colored hair to a fashionable golden hue.

Hydrogen Peroxide (H_2O_2), a compound of hydrogen and oxygen, containing a larger proportion of oxygen than water, the other compound of these elements. It was discovered in 1818 by Thénard, and was by him regarded as oxidized water as it very readily decomposes, when heated, into oxygen and water. The substance, when freed from water as completely as possible, is a thick transparent liquid, of sp. gr. 1.45, without color or smell, but possessing a bitter taste. It bleaches many vegetable colors, and when applied to the tongue or skin produces a white spot and gives rise to considerable pain. Its bleaching action and most of its chemical characters depend upon its powerfully oxidizing properties. It is employed, in dilute solution, for the restoration of oil paintings, its action upon these being an oxidizing one.

Hydrogen Sulphide, H_2S, sulphide of hydrogen, hydric sulphide, sulphydric acid, hydrosulphuric acid, sulphuretted hydrogen. A gas obtained by passing hydrogen through sulphur, or by burning sulphur vapor in hydrogen. It is formed by the putrefaction of organic bodies containing sulphur; by allowing a soluble sulphate to remain in contact with decaying animal or vegetable matter, $CaSO_4 = CaS + 4O$, the oxygen uniting with the organic matter, the probable origin of sulphuretted springs. But H_2S is generally prepared by the action of eight parts water + one part H_2SO_4, on ferrous sulphide, $FeS + H_2SO_4 = FeSO_4 + H_2S$; the water dissolves the ferrous sulphate. Pure H_2S is obtained by heating roughly powdered antimony tersulphide with hydrochloric acid, $Sb_2S_3 + 6HCl = 3H_2S + 2SbCl_3$; the gas is washed by passing it through water. Granulated zinc and fragments of native PbS acted upon with dilute HCl gives off a regular current of H_2S. Hydrogen sulphide is a colorless inflammable gas, of a sweetish taste and odor of rotten eggs. It is a narcotic poison. It burns with a blue flame, forming water and SO_2. A mixture of two volumes of H_2S and three volumes of oxygen explodes violently on sending an electric spark through it. Chlorine decomposes it, the whole of the sulphur being separated; this is the best antidote to poisoning by H_2S. Water at 0° dissolves 4.37 volumes, at 15° 3.23 volumes of H_2S. The solution reddens blue litmus paper; it decomposes in the air, sulphur being deposited. H_2S in contact with a base and a moist atmosphere is partially converted into H_2SO_4. At a pressure of 17 atmospheres at 10° hydrogen sulphide is reduced to a liquid, which boils at −61°; it freezes at −85°. CO_2 liberates H_2S from a moist sulphide; the composition of H_2S can be shown by heating metallic tin in a given volume of the gas; the sulphur unites with the tin, and the hydrogen liberated occupies the same volume as the original gas. H_2S is used as a test for metals; if the sulphide is soluble in acids, it is not precipitated till the solution is neutralized, as free acid is liberated by the H_2S, as $ZnSO_4 + H_2S = ZnS + H_2SO_4$. The sulphides of the alkaline earths Ba, Sn, Cn, and Mg, and those of the alkalies are soluble in water.

Hydrography (hī-drog′rä-fē), a branch of science which deals with the measurement and description of the seas, lakes, rivers, and other waters, as used for purposes of commerce or navigation; the art of marine surveying and of the construction of charts.

Hydroida (hī-drō'ē-dä), in zoölogy, a typical sub-class of *Hydrozoa*. They have an alimentary region or polypite provided with an adherent disk or hydrorhiza and prehensile tentacles. Unlike hydra, the type of the sub-class, most of the hydroida live in societies, each of which constitutes a polypidom so like a seaweed that it is often collected as such. But while the apertures on an ordinary seaweed are only minute pores, the *Hydroida* have little cup-like cells along the stem and at the extremities of the branches, in which the individual polype lives. The cells have a small hole at the bottom, and the stock is hollow, so as to enable the individual polypes to remain part of a compound organism. The sub-class is divided into five orders, *Hydrida*, *Corynida*, *Sertularida*, *Campanularida*, and *Thecomedusæ*. The *Polyzoa* or *Bryozoa*, once ranked with the sub-class, now figure as a distinct class, arranged under the sub-kingdom *Molluscoida*. See HYDROZOON.

Hydrometer, an instrument for determining the specific gravity of fluids. The name lactometer is also given to a small instrument of the kind when it is graduated in such a way as to be convenient for determining the specific gravity of milk, and by that means ascertaining its purity. The following is the hydrostatic principle on which the use of the hydrometer depends. When a solid body floats in a liquid, and thus displaces a quantity of the liquid, it is supported by the same upward pressure that formerly supported the liquid which it displaces. The weight of the solid body is thus equal to the weight of the liquid that it displaces. From this two statements follow: (1) That the depth to which the same solid body is immersed in a liquid is greater as the density of the liquid is less, and less as the density of the liquid is greater; the depths to which the same body is immersed in various liquids are inversely proportional to the density of the liquids; (2) the weights required to immerse a given body equally deep in various liquids are inversely proportional to the densities of the liquids. On each of these statements a form of hydrometer is founded. One kind is often called the constant weight hydrometer, the other the constant volume hydrometer.

Fig. 1 shows the first kind. These instruments are usually made of glass; each of them has a large hollow bulb, below which there is a smaller bulb weighted with mercury, to make the instrument float upright; and it is surmounted by a cylindrical glass stem which is graduated, the divisions being usually marked on a piece of paper inclosed within the stem. The depth to which the hydrometer sinks in the liquid gives, as has been explained, the density. There are several methods of graduation of the stem. The size and form of the instrument, and the method of graduation adopted depend on the purpose for which the instrument is intended. For example, lactometers and alcoholometers are sometimes constructed in such a way that the read-

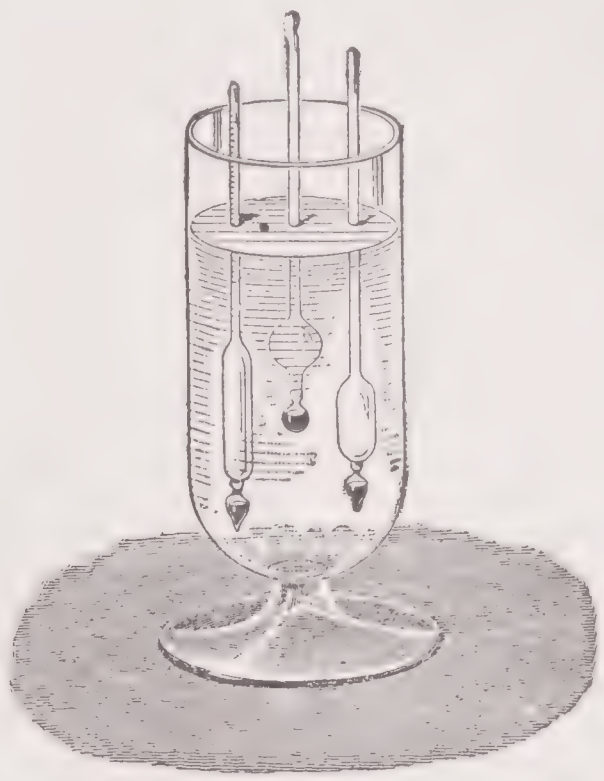


FIG. 1.—FORMS OF HYDROMETER.

ings on the stem afford an easy method of reading off the amount of water that has been added above a certain assumed point. For general use, however, it is usual to have the hydrometer graduated on some

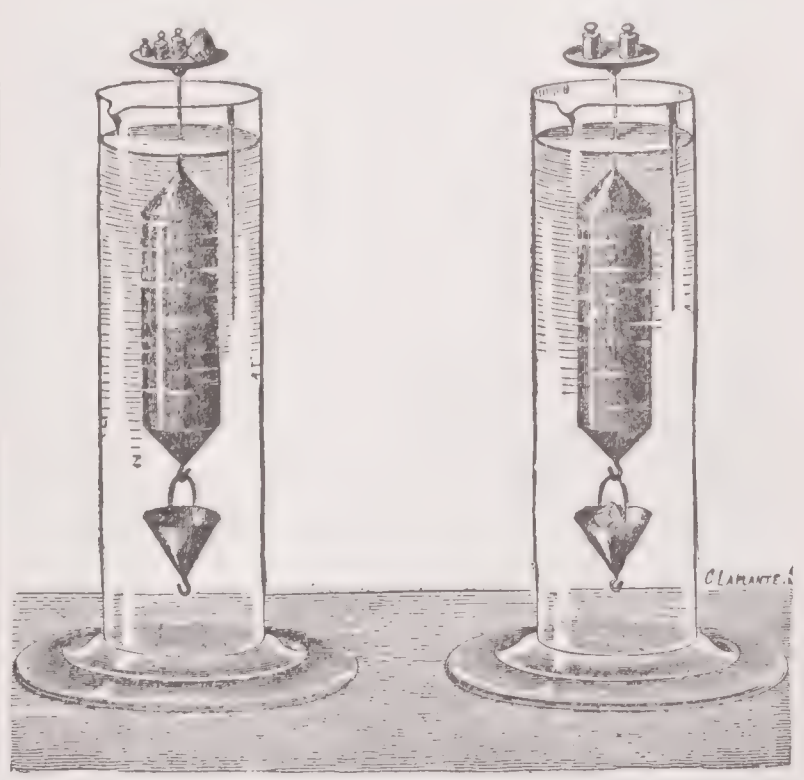


FIG. 2.—NICHOLSON'S HYDROMETER.

system, of which Beaumé's hydrometer and Twaddell's hydrometer are the best known. A table is generally employed, by means of which, from the reading on the hydrometer, the density of the liquid may be at once determined; otherwise a formula for calculation is used. For purposes requiring any

degree of exactness over any considerable range a large number of hydrometers are used, each of them being applicable to a certain range of densities. Two instruments at least are always used; one for liquids having a greater, and the other for liquids having a less specific gravity than distilled water.

Of constant volume hydrometers we shall only describe one, namely, Nicholson's hydrometer; a beautiful instrument, which is adapted for determining the specific gravities not only of fluids, but of solids also. It is shown in fig. 2. It consists of a hollow cylinder of metal, surmounted with a very fine metallic stem, to the top of which there is attached a plate or pan for weights. From the bottom of the metallic cylinder hangs a kind of cup or basket. The whole instrument is weighted so as to float upright. On the fine metallic stem there is a marked point; and by putting weights on the upper pan the hydrometer is always made to sink precisely to the point. Thus the volume immersed is always the same. From what was said above, it is seen at once that different weights are required to sink it to the marked point in different liquids, the denser the liquid the greater being the weight required; and if the weight of the instrument itself is known, and also the standard weight, or weight required to sink it to the marked point in distilled water, the calculation of the specific gravity of any liquid from an observation with the instrument is very easy.

In order to determine the specific gravity of solids by means of Nicholson's hydrometer, the instrument is placed in distilled water and the solid body is put on the upper pan. Weights are then added till the hydrometer sinks to the marked point. But the standard weight of the instrument being known, it is plain that the difference between it and the weights that must be added on the upper pan to the weight of the body whose specific gravity is to be determined must be the weight in air of that body. The body is now transferred to the basket below the instrument, and the weight of the solid in water is similarly determined. From these data the specific gravity of the solid is calculated in the ordinary way. The instrument here described is very convenient for use by mineralogists and others, being far more portable than a balance that would give equally trustworthy results.

Hydropathy (Greek, *hydor*, water, and *pathos*, affection or disease), a method of treating diseases by the application of cold water, which has come extensively into practice, though scarcely as yet recognized as a curative system by the medical profession. The efficacy of water as a hygienic

Hydropathy

medicine has been recognized from the earliest times. Hippocrates, Celsus, and Galen regarded water as of especial value in the treatment of acute diseases; and during the Middle Ages the same view was advocated by many famous physicians. During the 18th century there was in England a growing belief in its virtue as a curative agent, though rather in acute than in chronic diseases. Some physicians used water for internal treatment and others for external treatment, but hydropathy as now understood combines both methods. It was originated by Vincent Priessnitz, a Silesian peasant, who having, when a boy of 13, sprained his wrist, held it under the pump, and afterward bound a wet bandage on it. As this became dry he re-wet it, and thereby reduced the inflammation, but produced a rash on the surface of the skin. Shortly afterward he crushed his thumb, and applied the wet bandage as before and again an eruption showed itself. He concluded that the rash was an indication of impurity of the blood; and having instituted a series of observations in regard to various wounds and ulcers on the persons of his neighbors, he was led to form a pathological theory, according to which disease is caused by an accumulation of morbific matter, which must be eliminated from the system by cold water applications and the observance of a strict regimen. His views were confirmed by an accident to himself, in which, through a cart running over him, he received some broken ribs and severe contusions, and was given up by the physicians; but on learning their opinion he tore off their bandages, and applied others wet with cold water. He also replaced his ribs by inflating his lungs while pressing the abdomen against a window sill. Either through or in spite of this treatment Priessnitz contrived to recover, and the carrying out of this cold water theory became the object of his life.

In rapid succession he invented the sponge bath, the wet sheet packing, the sitz, the foot, and arm baths, the douche, the stream bath, the dripping sheet, the plunge, the dry blanket packing, and other appliances of the hydropathic system. In 1829 he established, in his native village of Gräfenberg, a range of baths, which speedily grew in reputation, and attracted visitors from all parts of Europe. The Austrian government lent him its patronage, and all the opposition of the medical faculty was unable to stem the popularity of the new system. The original establishment at Gräfenberg soon expanded into an extensive suite of buildings, stretching along the slope of one of the Sudetic mountains, and resorted to by troops of invalids, who sought to regain health by bathing, exercise, simple diet, and agreeable society. Other hydropathic institutions soon sprang

up in other parts of Germany and were at length introduced into England, a hydropathic society having been formed in London in 1842. It was unfortunate that Priessnitz had not had a regular medical education, and that many of the most enthusiastic advocates of his system have no scientific knowledge of disease and no professional culture. Hydropathy is popularly but unfortunately named the "water cure," a designation both incomplete and misleading. Drs. Wilson, Johnson, and Gully were the first to commence the practice of the cold water cure in England, and by the able advocacy of the two latter, through their writings, the system took root and advanced rapidly in popular estimation. Hydropathic establishments were erected at Malvern, Ben Rhydding, Rothesay, and other parts of the United Kingdom; and before Priessnitz's death in 1851 he had the satisfaction of seeing his system adopted extensively both throughout Europe and the United States. The treatment pursued is mainly that introduced by him, with some modifications, that pursued at Gräfenberg having been extremely rigid and severe, and calculated to deter many persons from subjecting themselves to it. In many cases there can be no doubt of patients having received great and lasting benefit by a sojourn at a hydropathic institution, and the free use of cold water in its various forms of appliance; but it may well be doubted whether these advantageous results are not as much to be attributed to the ablutions, exercise, and diet to which in such circumstances they readily conform themselves as to any inherent curative virtue in the wet bandages, douches, and other forms of hydropathic treatment.

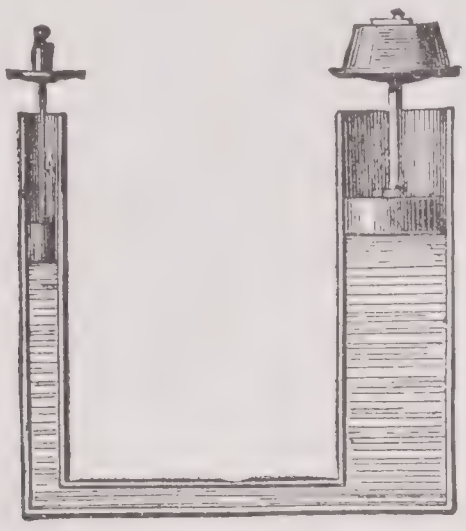
Hydrophobia, rabies, from bite of mad dog, more rarely cat, wolf, or fox; a contagious disease, the result of a specific poison. The great danger lies in the fact that a person bitten by a supposed mad dog imagines or simulates its symptoms, especially if nervous or hysterical; whereas only a few of those bitten by a mad dog take the disease. The average period of incubation is 40 days, but it varies from 15 days to two years. Immediate cauterization or excision of the part is the only effective remedy. After the disease appears, inhalation of chloroform and sub-cutaneous injections may be tried, but, unless all that is claimed for Pasteur's method of inoculation prove true, the antidote is yet to be found. The Pasteur method of inoculation is as follows: A rabbit is inoculated with a fragment of the spinal cord of a mad dog. The animal is affected with hydrophobia in the space of about one fortnight. A portion of its spinal cord is employed to inoculate a second rabbit, which also contracts the disease, but more rapidly; the spinal cord of this second rabbit serves to inoculate a third, and so on. It is observed that at each step of this process the intensity of the disease becomes greater, and the period of inoculation shorter. When the spinal cord of these animals, which have died of hydrophobia, is suspended in a perfectly dry tube its virulence diminishes by degrees, and at last disappears. A collection of these spinal cords, some of them entirely stale and powerless, others more fresh and active, others, again, quite fresh and extremely active, are always kept in readiness. To render a dog insusceptible to rabies he is first inoculated with the stale and powerless specimens, then with fresher and more active ones, and lastly with the most powerful of all, when he becomes quite proof against the inoculation of rabies. Pasteur claimed that by the same process of successive inoculations with a virus of constantly increasing intensity he can produce in the human being a corresponding immunity against hydrophobia. His first patient was thus treated by him in July, 1885. It was a young boy who had been lacerated by a mad dog, having 14 bites in different parts of his body. Since then many other cases have been treated, including the Newark children, who made a trip to Paris for the purpose of receiving these inoculations. As to the real merits of this supposed discovery: It may really possess all the power which the enthusiasm of its discoverer attributes to it; it may be worthless. The difficulties that surround the subject will be appreciated when it is remembered that (1) 60 per cent. of people bitten by mad dogs do not develop hydrophobia; (2) the incubation of the disease is sometimes extremely long, cases having been known to be deferred till two years after the bite.

Hydroquinone (hī-drō-kwin-ōn′), $C_6H_4 <^{OH}_{OH}$ (1—4), a para-diatomic phenol, obtained by dry distillation of quinic acid, or by heating an aqueous solution with plumbic dioxide, $C_7H_{12}O_6 + O = C_6H_4(OH)_2 + CO_2 + 3H_2O$; also from arbutin, which, when boiled with dilute sulphuric acid, yields hydroquinone and glucose. It has been obtained synthetically by heating para-iodophenol with potash to 180°; but it is easiest obtained by passing SO_2 into an aqueous solution of quinone, $C_6H_4 <^{O}_{O}>$ till it becomes colorless; it is then evaporated, and the hydroquinone extracted with ether; also by oxidizing one part of aniline, eight parts of H_2SO_4, and 30 of water, with two and a half parts of $K_2Cr_2O_7$. Hydroquinone crystallizes in colorless prisms, which melt at 169°, which can be sublimed, but if heated strongly it is decomposed. It is easily soluble in water, alcohol, and ether. Ammonia turns an aqueous solution of hydro-

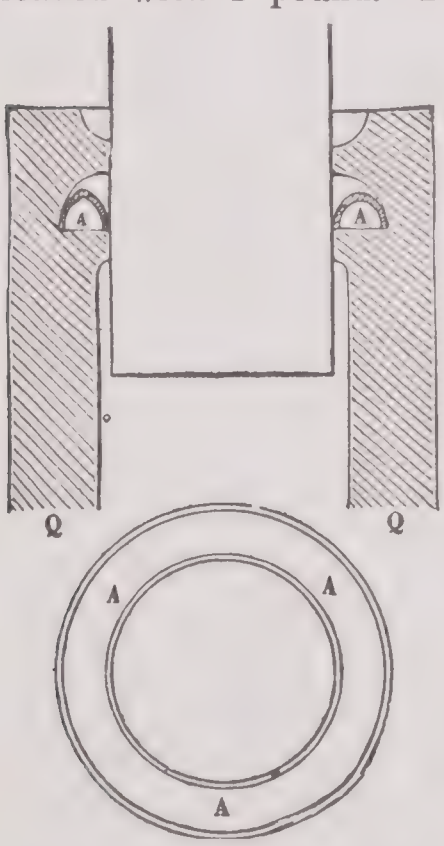
quinone a red-brown color. Ferrichloride converts it into quinone.

Hydroscope, an instrument for measuring the moisture of the air or other gas.

Hydrostatic Press, or **Bramah Press.** sometimes called HYDRAULIC PRESS. The principle of this machine will be easily understood from the explanations that are given in our article on hydrostatics and from the accompanying figures. Let two tubes of unequal area be connected, and the whole vessel filled with water. For simplicity let the area of the smaller tube be 1 square inch, and let the piston that closes it be loaded with 1 pound. From the principle of equal transmissibility of pressure, a pressure of 1 pound per square inch will be exerted on every part of the boundary of the fluid. There will thus be a pressure of 1 pound per square inch put on the piston that closes the larger tube; and if we suppose the area of the piston to be 16 square inches, it is evident that it must be loaded with 16 pounds in order that the pressure to which it is exposed may be equilibrated. Thus a load of 1 pound on the smaller piston supports 16 pounds on the larger.



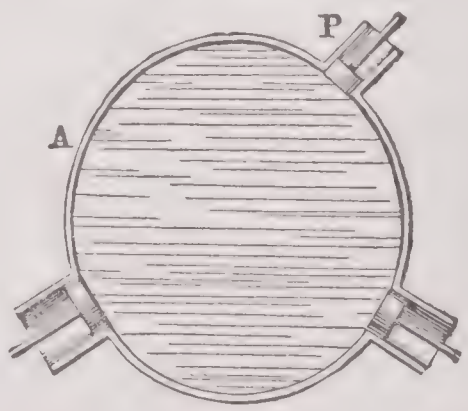
PRINCIPLE OF THE HYDROSTATIC PRESS.



CUP LEATHER.

The principle of the hydrostatic press was pointed out by Stevinus; but it was Bramah who, in 1796, by an ingenius contrivance, gave the principle practical application. A Bramah press, as ordinarily constructed and used to provide immense pressure, is a simple enough contrivance. By means of a small pump water is pumped from a cistern through a small horizontal tube into the space that receives a large piston. The goods to which pressure is to be applied are placed between the plate attached to the large piston and an upper plate that is kept in position by powerful iron rods. The water-tight stuffing of the piston is the great difficulty in the construction of the machine, and it was the invention of a water-tight collar by Bramah that made the use of the press practicable. The diagram shows a section A A of the collar surrounding the piston P. The collar consists of a circle of solid leather, which is stamped by means of a die into the half-ring, of which a section is seen. When the pressure is applied the water fills the channel formed by the half-ring, and squeezes the inner side of the ring against the piston, and this takes place with greater force the greater the pressure to which the water is subjected.

Hydrostatics, the part of the general science of hydrodynamics that treats of the application of forces to fluids at rest. It is generally divided into two parts, one, hydrostatics proper, which deals with incompressible fluids, such as water, with liquids in fact; and the other, which deals with compressible fluids, that is with gases. The latter part of the subject is commonly called pneumatics. We can only consider here a few of the leading principles of hydrostatics. The subject cannot be treated with anything approaching to completeness except at far greater length than that which our limits here allow us.



The property of fluids which distinguishes them from solids, is want of rigidity. A fluid offers no permanent resistance to forces tending to change its shape. The particles of a fluid are mobile; and while in the case of liquids very considerable forces of cohesion are exhibited, yet the particles show great freedom to alter their relative positions, and to pass from place to place within the general mass.

A very important property that follows from the nature of fluids is that of the equable transmission of pressure. For simplicity let us consider, in the first place, the case of a weightless liquid, and suppose

Hydrostatics

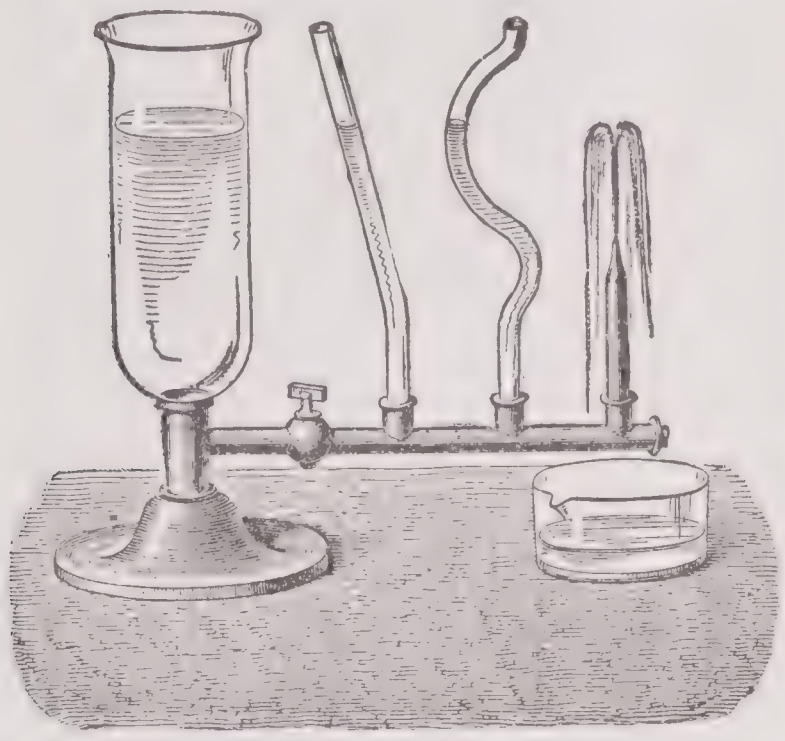
it inclosed in a vessel A, which is fitted with a piston P. If pressure is applied to P it will be transmitted in all directions through the liquid. If other openings are made, and if they are fitted with pistons, it is evident that to keep each of these pistons in its place, pressure inward must be applied. The pressure that must be applied to any piston equal in area to the area of P is equal to the pressure on P; and if the area of one of the other pistons is greater or less than the area of P, the pressure required to keep it in its place is proportionately greater than or less than the pressure that is applied to P. This principle, which is the most important in hydrostatics, finds a practical application in the hydrostatic, or Bramah press.

In measuring fluid pressure the area exposed to the pressure of the fluid is to be considered. Thus, it is usual to speak of pressure per square inch, pressure per square foot, or pressure per square centimeter in various cases. If it were required to calculate the force that must be applied to the rod of one of the pistons in the figure in order to keep the piston in its place, it would be necessary to know the area of the piston and the pressure on it in pounds per square inch or in grams per square centimeter. When the pressure over a given area is not uniform we must then know the law of variation, or at least the average pressure over the whole area, in order to calculate the whole pressure on it; and it will be readily understood that when, in such a case as this, the pressure per unit area at a point is spoken of, it is understood to mean the pressure which would be exerted on unit area were there found a unit of area pressed with a uniform pressure, the same as that at the point in question. Not only is pressure transmitted out to the surface or envelope of the liquid, as is shown in the figure, but within the fluid itself the particles are all pressed together. The pressure is transmitted to every point within the liquid and may be observed to be acting there. When a solid is immersed in the liquid it is pressed at every point of its surface in the direction perpendicular to the surface at that point, and in the case of the weightless liquid that we have been considering, with a pressure equal in amount per unit of the area to that applied from without to the liquid. The pressure about any point in a fluid is equal in all directions, and when any surface is exposed to the pressure, the direction of it is normal to the surface at every point.

Leaving the theoretical conception of a weightless fluid, let us next consider the effect of the weight of a fluid on the pressure at any point within the fluid. It is evident, in the first place, that the lower layers of the fluid sustain more pressure than the upper layers. For whatever pressure the upper layers are exposed to is transmitted to the lower layers; and over and above that pressure, the lower layers have to support the weight of the superincumbent liquid. Thus, in the case of a liquid contained in a closed box and exposed to any pressure whatever applied by means of a piston from without, this pressure is transmitted, as we have seen, to every part of the liquid; but any layer in the lower part of the vessel is exposed to an additional pressure due to the weight of the liquid above it.

The most important case to consider is that of liquids having a free surface, that is, a surface exposed to the air. Here the surface itself is level, that is, everywhere perpendicular to the direction of apparent gravity. This easily follows from the mobility of the particles of the liquid. Were the surface not level there would be a tangential force which would make it flow down till the level state is reached. In every horizontal layer throughout the liquid the pressure per unit area is the same; and this is the case independently of the shape of any vessel in which the liquid may be contained. The pressure per unit area in any horizontal layer depends only on the height of the free surface of the liquid above the layer considered, and the specific gravity of the liquid; and it is equal to the weight of a column of the liquid of unit sectional area whose height is the height of the free surface. This principle gives rise to remarkable results. Take, for instance, an apparatus consisting of a pair of circular boards connected by a belt of pliable leather (like a pair of bellows), and having a small tube inserted into an opening near the bottom, and from it a tall tube rising perpendicularly. Heavy weights may be put on the upper circular board, and if water be then poured into the upright tube they will be raised up by the pressure from below of the water. For the pressure to which the under side of the circular board is exposed is equal to the weight of a column of water whose section is that of the circular board, and whose height is the difference of the heights of the under surface of the circular board and of the free surface of the water in the small upright tube. When shown in this form the principle here employed is often called the hydrostatic paradox, on account of the very great pressure that a very small quantity of water may be made to give rise to. The principle just explained acts occasionally with immense force in nature. Thus, if there is a cavity of great extent and at a considerable depth in a rock, and if this cavity is filled with water, while a small stream runs down into it from a great elevation; in this case the pressure on all sides of the cavity when filled may become sufficient to rend the rock asunder.

It is a well-known principle that liquids tend to find their own level. Thus, in the accompanying figure, showing a series of connected vessels, the liquid is seen to stand at the same height in the principal vessel and in the variously shaped tubes communicating with it, while from the short, narrow mouthed tube it spouts up to nearly the level of the water in the principal vessel.



When a solid is immersed either partially or wholly in a liquid a portion of the liquid is displaced. The solid is at the same time pressed at every point by the liquid, the pressure being always normal to the surface. The pressure from point to point may be calculated; but without any calculation there is one important principle evident, namely, that the upward pressure on the solid is greater than the downward by an amount equivalent to the weight of the liquid displaced by the solid. For if, instead of the solid, the quantity of liquid displaced by it were present, its weight would be upborne by the pressure on every side. These pressures now act on the solid and whether or not the solid floats under their influence, as much of the weight of the solid as corresponds to this pressure is supported by the surrounding fluid. These considerations applied to the phenomenon of floating bodies illustrate the principle just explained; and the experiments that are made for the purpose of determining the specific gravity of bodies heavier than water also depend on that principle. In fig. 15 the apparatus that is used is shown. The body whose specific gravity is to be determined is suspended from the scale pan of a balance, and its weight is determined. It is then placed in such a position that, hanging down from the scale pan, it is immersed in water, and it is now found to have a smaller apparent weight, the apparent loss

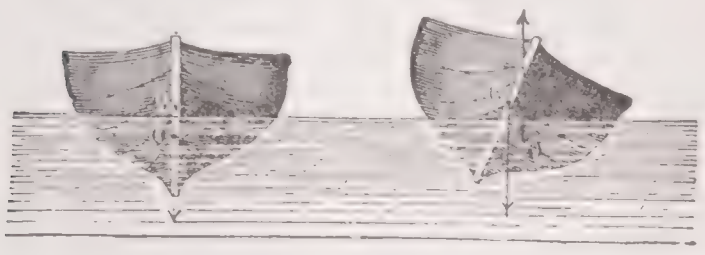
Hydrostatics

of weight depending on the volume of water displaced. According to the definition of specific gravity, the ratio of the observed weight in air (or more exactly *in vacuo*) to the loss of weight when the body is weighed in water is the specific gravity of the solid.

A very simple experiment serves to illustrate the principles that have just been discussed as well as some of those that will be considered in the following paragraph. Let any three jars of ordinary shape be taken. Let the first be filled with pure water, the second with moderately strong salt and water, and let the third be half filled with the salt and water, and then cautiously filled up with fresh water in such a way that the fresh water floats on the top of the brine. This may easily be done with a little care and practice. An egg put into the first sinks to the bottom. In the second it floats at the top, because the brine has a specific gravity so great that a volume of it equal to the volume of the egg weighs more than the egg weighs. In the third the egg will be seen to float at the surface where the brine and the supernatant fresh water are in contact. If now the brine and fresh water are stirred together so as to be mixed a liquid may be easily obtained by slightly varying the proportions of brine and fresh water, in which the egg will have little or no tendency either to sink or float, and in which, if it is placed in any part of the jar, it will remain at rest just supported. In this case the specific gravity of the liquid is such that a volume of it equal to the volume of the egg has precisely the same weight that the egg has.

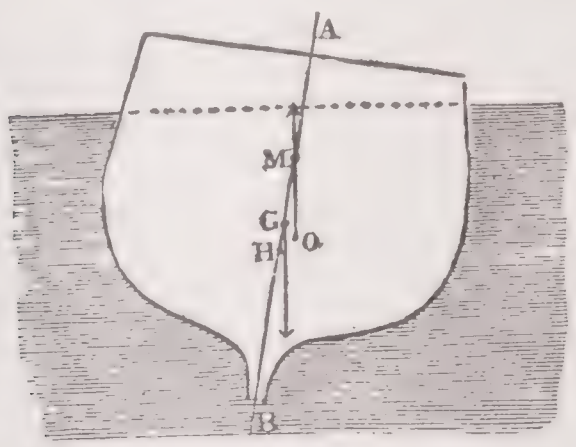
The conditions of floatage and of stability of a body floating in a liquid are of great importance. A floating body displaces, as has just been remarked, a certain quantity of the liquid, and the weight of the solid body is equal to the weight of the liquid that is displaced by it. To calculate how much of the body is submerged, and how much floats above the liquid, it is only necessary to consider what volume of the liquid would be equal in weight to the weight of the floating body. For example, the specific gravity of ice is about nine-tenths of that of ordinary sea water. Hence 9 cubic feet of sea water weigh as much as 10 cubic feet of ice. Thus in an iceberg nine-tenths of the ice is under water, and one-tenth is above the surface. In ships and other floating bodies the stability depends on the form of the body. A sphere of wood floating in water is indifferent as to position. The slightest force is sufficient to overturn it from any given position or to set it rotating in the water. With a ship or other body that must float with one side upward, the stability is quite as important as the floating power. The accompanying figure illustrates the conditions

of stability. When a solid body, such as the boat in the figure, is slightly displaced from its ordinary position of equilibrium, the forces that act upon it are seen to be twofold. First, there is the force of gravity on the solid acting vertically downward, which, if G be the center of gravity, may be considered to act downward through that point; and secondly, there is the resultant of the upward pressures of the various portions of the liquid, which, if O be the center



of these upward parallel forces, may be considered as equivalent to a single force acting vertically upward through that point. In the figure these two equal parallel forces are seen to form a mechanical couple, whose tendency is to right the boat and bring it back into its ordinary floating position. But if the upward vertical line through O were on the other side of the downward vertical line through G, it is plain that the effect of the couple would be to carry the boat away from the position in which it ought to float; and the boat would thus be unstable. The stability or instability of a floating body depends evidently on the form of the submerged portion of the floating body.

This is a matter for calculation with engineers and shipbuilders. But it must be remembered, that though a floating body may be very stable indeed in a certain position, yet when it has been displaced beyond a certain limit from its ordinary position, it may, from its shape, become actually unstable. This is not the case with a rowing



boat such as that represented in the figure, for no displacement short of putting the side under water would render this form of body unstable; but in some forms of ships this is the case, and it is want of attention to this principle that has caused many shipping disasters. A ship of low free board may be very "stiff," as it is called, up to a certain limit, that is, may possess up to that limit very considerable righting moment, but by being pressed beyond a certain point by means of the sails, or by rolling beyond a certain limit in a heavy sea, it may actually become unstable and overturn without hope of recovery.

The metacenter is a point in a floating body of great importance. The position of the metacenter in fact determines whether the equilibrium is stable or unstable in any case. Let A B in the figure be a line drawn through the points G and H, the center of gravity of the floating body, and the center of the figure of liquid displaced when the body is floating with A B vertical. Let the body be then slightly displaced, and let O be the new position of the center of the figure of the displaced liquid, and let M be the point in which A B is cut by a vertical line through O; M is the metacenter when the displacement from the original position is infinitesimal. If the metacenter is above G then the equilibrium is stable; if it is below G then the equilibrium is unstable, and the body being slightly displaced, it tends to fall further and further from its position of equilibrium.

There are many instruments and machines founded on the hydrostatic principles that have been laid down here. The barometer, the siphon, the pump, the hydrostatic press, the hydrometer, are examples. For information respecting them the reader must consult articles under the special names belonging to them.

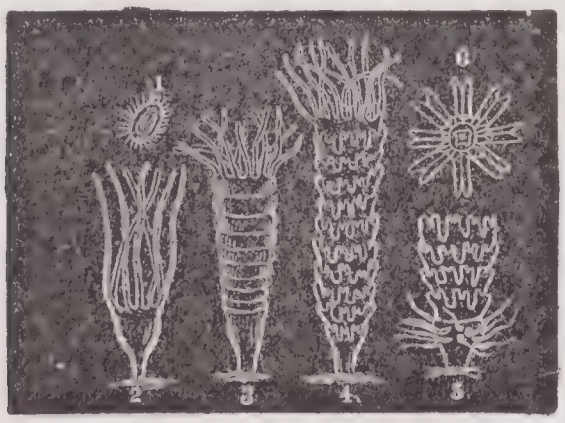
Hydrosulphuric Acid, or sulphuretted hydrogen or hydrothionic acid (H_2S), is a colorless inflammable gas produced by the putrefaction of sulphurous organic matters. Many mineral waters contain it naturally. It may be artificially produced by burning sulphur vapor in hydrogen, or by passing hydrogen through sulphur. It has a sweet taste but a very nauseous odor as of rotten eggs. It has poisonous effects when breathed, and experiments have shown that birds perished in air which contained $\frac{1}{1500}$th part of the gas.

Hydrothorax, a name given to serous fluid occupying the pleura. It may take place as the result of inflammation, also in heart disease, in disease of the kidneys, and sometimes in anæmia.

Hydroxylamine (hī-drō-zil′ä-mīn), $NH_2 \cdot OH$ obtained by passing nitrogen dioxide through a series of vessels containing tin and hydrochloric acid, precipitating the tin by H_2S, filtering, evaporating to dryness, washing with cold alcohol, then boiling with absolute alcohol, adding ether, which precipitates the hydrochlorate of hydroxlyamine, $NH_2OH \cdot HCl$, in crystals. Also by the action of hydrogen, obtained from tin and HCl on ammonium nitrate, or ethyl

nitrate. The base is very volatile and easily decomposed: it is only known in solution. Hydroxylamine gives a light green precipitate with cupric sulphate, which is reduced to cuprous oxide on boiling with water. Hydroxylamine is a powerful reducing agent. A solution of the base can be obtained by decomposing the nitrate dissolved in alcohol by alcoholic potash, also by the addition of an alkaline carbonate to the hydrochlorite. The salts of hydroxylamine are decomposed by potash with evolution of nitrogen and formation of ammonia.

Hydrozoön, (hī-drō-zō′on), a name given by Owen, followed by Huxley, to the great class of the sub-kingdom *Cœlenterata*, of which *hydra* is the type. They exhibit a definite histological structure, their tissues having a cellular organization. These tissues are two, an outer or ectoderm, and an inner or endoderm. The digestive cavity communicates directly by a wide aperture with the general cavity of the body. The digestive sac and the reproductive organs are developed as outward processes of the body wall. In most the prey is seized by tentacles surrounding the mouth and furnished with offensive weapons called thread cells. The hydrozoa are all aquatic, and nearly all marine. Their distribution is worldwide. They are the *Dimorphœa* of Ehrenberg, the *Sertularians* of Milne Edwards, and the *Nudibranchiata* of Farre. Huxley divided the class into three orders, *Hydrophora*, *Siphonophora*, and *Discophora*, doubtfully adding as a fourth the *Trachy-*



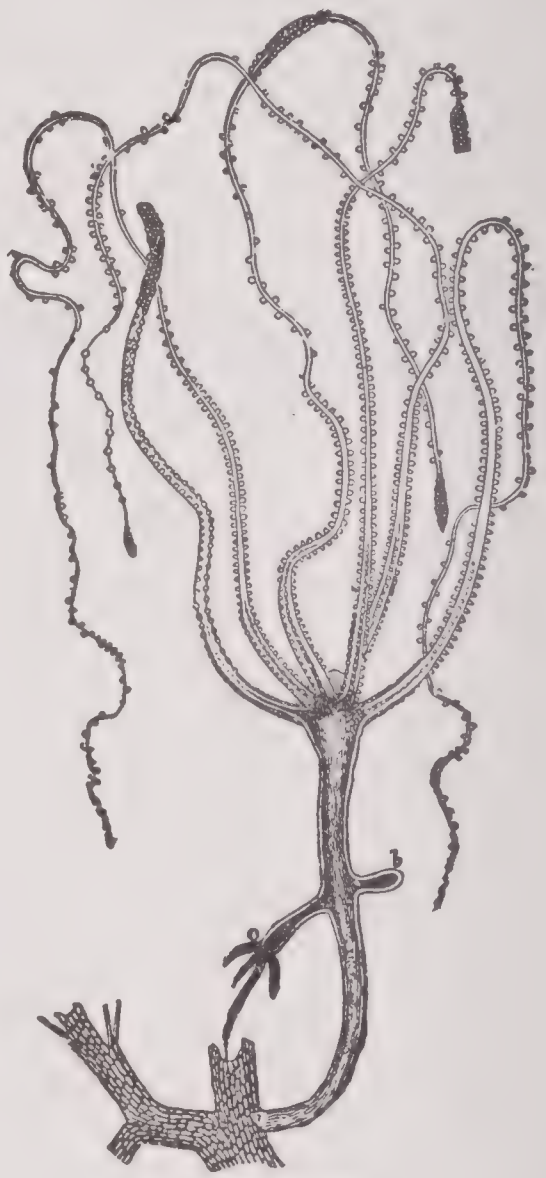
HYDROZOON.

1, ciliated embryo or "planula"; 2, hydra tuba, showing a single individual; 3, hydra tuba undergoing segmentation; 4, the segmentation becoming more complete; 5, more advanced stage, in which the tentacles are developed from the first or basal segment; 6, ephyia form, giving rise to a free-swimming Medusoid.

medusœ of Haeckel. Nicholson divides them into six sub-classes: *Hydroida*, *Siphonophora*, *Lucernarida*, *Discophora*, *Graptolitidæ*, and *Hydrocorallinæ*.

Hydruntum. See Otranto.

Hydrus, in astronomy, the water-snake, or sea-serpent, considered of the masculine gender to distinguish it from Hydra further N., one of the 12 southern circumpolar constellations added by the early navigators to the southern hemisphere in the 15th century. Its brighest star, Beta, is of the 2.7 magnitude, Alpha being 2.9. The constella-



HYDROZOON.

Hydra fusca, with a young bud at b, and a more advanced bud at c.

tion lies between Octans, Tucana, Eridanus, Horologium, Reticulum, Dorado, and Mensa.

Hyères (ē-ār′), a small town of France, 3 miles from the Mediterranean. It is celebrated for the beauty of the situation and the mildness of the climate, and is therefore much resorted to by foreigners suffering from consumption or nervous complaints.

Hygeia, or Hygieia, the Greek goddess of health, daughter or wife of Æsculapius. Her statues (of which the most celebrated was at Sicyon) sometimes represented her with a large serpent coiled round her body, and elevating its head above her arm to drink of a cup which she held in her hand. Isis, in Egyptian monuments, appears sometimes in a similar attitude.

Hygiene, the study of the prevention of disease, the art of preserving health, and securing what Juvenal considered the best gift of the gods, *mens sana in corpore sano* ("a sound mind in a sound body"), through wise sanitary precautions, and at-

tention to diet, regimen, etc. In this way growth will be increasingly perfected, life more vigorous, decay less rapid, and death more remote.

Hygrometer (hī-grom′ē-ter), an instrument for measuring the comparative moisture of the air. There are three kinds: (1) those which act by absorption; (2) by condensation, and (3) those in which the hygrometric condition is deduced from observations of a wet and dry bulb. Of the first class is the hygrometer of Saussure (died 1799). It consists of a human hair boiled in lye, and acts by absorption and evaporation, lengthening or contracting as the air is more or less moist.

Hygrometric Balance, an instrument for indicating the relative density of the air, and consequent changes of rain or dry weather. It consists of a balance, from one arm of which is suspended a brass weight, and from the other a large, thin, hollow cylinder, closed at each end. The two are arranged so as to be in equilibrium at a given density of the atmosphere, and it is evident that if the air become heavier, the large cylinder, displacing more air than the solid weight, will become more buoyant and ascend. If, on the contrary, the air become lighter, it will sink. A rod descending from the scale-beam serves to indicate, on the graduated arc below, the comparative density of the air at the time of making the observation. If the air be heavy, fine weather may be expected; but if the cylinder sink, rain usually follows.

HYGEIA AND ÆSCULAPIUS.

Hygroscope (hī′grō-skōp), a name sometimes given to an instrument for indicating the presence of moisture in the atmosphere, without measuring its amount. Hygroscopic substances are those which imbibe moisture and become coated with a moist film.

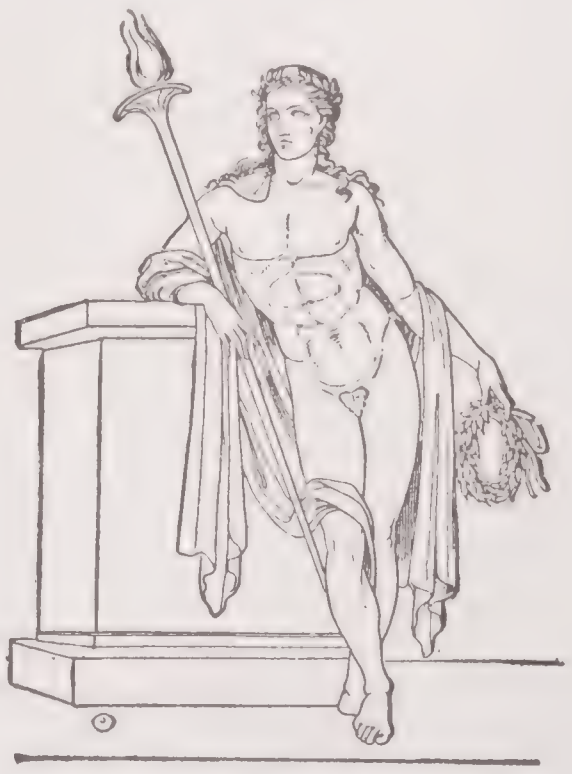
Hyksos. See SHEPHERD KINGS.

Hylæosaurus (hī-lē-ō-sou′ros), a gigantic fossil lizard discovered in the Wealden formation of Tilgate Forest. Its probable length was about 25 feet. It is one of the *Ornithoscelida*, the group which presents a structure intermediate between that of existing birds and reptiles.

Hylas (hī′las), the beautiful son of Theodamus, beloved by Hercules, and carried off by the Naiads, according to the legends of the Argonauts.

Hyllus (hil′us), a son of Hercules and Dejanira, who became, after the death of his father, the chief of the Heraclidæ, and married Iole. Driven from the Peloponnesus by Eurystheus, he took refuge with the Athenians and was subsequently the leader of the Heraclidæ against Eurystheus, whom he killed about 1207 B. C. He afterward perished in a combat with Echemus, King of Arcadia.

Hylozoism (hī-lō-zō′ism), a system according to which matter has a necessary existence, and is equally necessarily endowed with life. There are two forms: (1) that each atom of matter lives entirely independent of all other atoms; (2) that the whole world is a living being, whose material elements participate in a common life. The first form is the doctrine of Strato of Lampsacus, the second that of the Stoics, who conceived the universe animated by a living principle. Hylozoism reappears in the Alexandrian school, in the teaching of Cardan and Paracelsus, and in that of Spinoza, who attributed life to all things though in a different degree. "All things, however diverse in kind, are, nevertheless, animate."



HYMEN.

Hymans, Louis (ē-mäns), a Belgian historian; born in Rotterdam in 1829. He removed to Belgium in boyhood and rose rapidly to distinction as a Liberal journalist. He edited the "Belgian Star" and the "Parliamentary Echo" for some years, and

was elected to Parliament in 1859. He wrote: "History of the Marquisate of Anvers," "Popular History of Belgium," and "Political and Parliamentary History of Belgium"; two popular novels, "André Bailly" and "The Buvard Family"; and some pleasing poems. He died in Brussels in 1884.

Hymen, the Greek god of marriage, was son of Bacchus and Venus, or, according to another version, of Apollo and one of the Muses. The people of Athens instituted festivals in his honor, and solemnly invoked him at their nuptials, as the Latins did their Thalassius. Hymen was represented as crowned with flowers, holding a burning torch in one hand, and in the other a wreath. It was supposed that he always attended at nuptials; for, otherwise, matrimonial connections were fatal, and ended in dreadful calamities; hence people ran about on these occasions, calling aloud "Hymen!" "Hymen!" In anatomy, the name denotes the semilunar, parabolic, or circular membrane situated at the outer orifice of the vagina in virgins.

Hymenoptera (hī-men-op′ter-a), an order of insects, containing about 25,000 species, and now usually acknowledged to stand at the head of the class of insects, and of which many, as ants and bees, are singularly interesting and important. They have the mouth furnished with mandibles for cutting and tearing, but the other parts of the mouth are adapted for lapping and suction, and are generally narrow and elongated, often united into a kind of proboscis, as in bees. The antennæ are generally slender, but often exhibit differences in the sexes of the same species. The wings are four in number, the first pair larger than the second, the wings of the same side united in flight by little hooks. The wings, when at rest, are laid one over another horizontally over the body. Their metamorphosis is complete, the larvæ either, as in ants, wasps, bees, etc., being legless, or, as in the sawflies, with legs somewhat as in caterpillars.

Hymer, the giant, in Celtic mythology, who took Thor in his boat when that god went to kill the serpent; for which service he was flung by the ears into the sea.

Hymettus, a mountain in Attica, Greece; now called Trelo Vouni, to the S. E. of Athens, was famous among the ancients for its honey and its bluish marble. The honey is still in repute.

Hymn, a sacred composition in poetry intended to be sung with or without the aid of a musical instrument, and not being versified from the book of Psalms, else it is called a Psalm, or directly from any other part of Scripture, or else it is a paraphrase. Hilary, Bishop of Arles, is said to have composed the first hymn for Christian worship about A. D. 431, but as early as the time of Pliny the Younger the Christians are said to have habitually sung one to Christ as God. On Dec. 9, 633, the Council of Toledo sanctioned the use of hymns in churches. Luther did much to popularize hymnody in the infant Protestant Church in Germany. Of the hymns now in use many were composed by Isaac Watts, Charles Wesley, John Wesley, Cowper, John Newton, James Montgomery, John Henry Newman, Frederick William Faber, and Frances Ridley Hovergal. Many devotional English hymns are translations from the German, or from the Latin and Greek hymns of the early or of the medæval Church. Prominent among Americans who have written hymns are Oliver Wendell Holmes, Phœbe Cary, P. P. Bliss, Ira D. Sankey, Julia Ward Howe who wrote "The Battle Hymn of the Republic," Samuel Francis Smith, author of the national hymn "America," Timothy Dwight, Ray Palmer, who wrote "My Faith Looks up to Thee," Joseph Henry Gilmore, etc.

Hymnology (-nol′ō-ji), a collection of hymns; hymns collectively; the hymns used by any particular Church or body.

Hyndman, Henry Mayers, an English socialist author; born in 1842. He acted as special correspondent for the "Pall Mall Gazette" during the war between Austria and Italy in 1866, and was one of the founders of the Social Democratic Federation in 1881. His published works deal almost wholly with phases of socialism, especially as exhibited in Great Britain.

Hynobiidæ (etymology uncertain), a family of salamanders (see SALAMANDER) native to Japan, established by Prof E. D. Cope, the well-known American naturalist; its nearest relatives are a family of tailed amphibians (*Desmognathidæ*) in the United States.

Hyogo. See KOBE.

Hyoid Bone, or **Hyoid Arch,** in anatomy, the second arch developed from the cranium, giving support to the tongue and attachment to numerous muscles of the neck. It consists of a body, two larger cornua projecting backward, and two smaller cornua ascending from the angles between the body and two larger cornua. It is called also *Os linguæ*, because it supports the tongue. The U form is much less marked in the inferior vertebrates.

Hypatia (hī-pā′shē-ä), an Alexandrian teacher and heroine; born in Alexandria between 370–380. She was the daughter of Theon, an eminent mathematician of Alexandria, whom she succeeded in the government of that school, had a number of disciples, and became very cele-

brated for her lectures on Plato and Aristotle, both at Alexandria and Athens. Synesius in particular, who afterward became a Christian bishop, celebrated her praises in the most glowing terms. Orestes, the governor of Alexandria, had a high respect for Hypatia, and frequently consulted her on matters of importance. Between the governor and the patriarch Cyril there was bitter enmity, which broke out into open war, and the monks siding with their chief, assembled in a riotous manner against Orestes, who was obliged to fly from the city. They then seized Hypatia, and having torn her in pieces, burnt her mangled limbs to ashes, 415 A. D.

Hyperæmia (hī-per-ē′mē-ä), a plethora or fullness of blood. The whole mass of the blood is increased to a variable extent. The face is full and turgid, with a purplish tinge. There is a tendency to lassitude and sleep. Called also polyæmia.

Hyperæsthesia (hī-per-es-thē′zē-ä), an excessive excitability of the parts of the nervous apparatus which have to do with sensation, special or common. Abnormal sensibility to pain is, however, more correctly called "hyperalgesia." In this condition, as in tic-douloureux, the slightest stimulus may cause a paroxysm of pain, even a current of air or a noise bringing on an attack; while in hyperæsthesia of the special senses bright flashes of light may be seen, sounds may be heard, and even smells and tastes experienced in the absence of any objective cause. Of the diseases predisposing to hyperæsthesia hysteria is far the most frequent; but it is sometimes induced by rheumatism, gout, skin diseases, inflammatory affections of the central nervous system, while it often adds greatly to the distress in the early stages of various fevers. The treatment of hyperæsthesia is that of the morbid change on which it depends, but the local application of anodynes, ice, or warm poultices, and sometimes the use of electricity may do much to diminish the patient's sufferings for the time.

Hyperbola (hī-per′bō-lä), in mathematics, one of the three conic sections. It is a plane curve of such a form that if from any point in it two straight lines be drawn to two given fixed points, the excess of the straight line drawn to one of the points above the other will always be equal. The two points are called the foci. If a cone be cut by a plane in such a direction that the plane cuts the base at a greater angle than the side of the cone makes, a hyperbola will be generated. If two cones, placed apex to apex, be both cut by a plane the hyperbolas will be generated with their convexities turned to each other. If a straight line be drawn from the foci and then bisected, the point of bisection is called its center. The distance from either focus to the center is its eccentricity. Any straight lines drawn through the center and terminated by two opposite hyperbolas is called a diameter. The point where it cuts the hyperbola is its vertex. The diameter which passes through the foci is called the axis major, or principal axis. An axis minor, or minor axis, can be constructed at right angles to the first. Other terms used of the hyperbola are abscissæ, parameter, *latus rectum*, directrix, and a term peculiar to it, asymptotes.

Hyperboreans (hī-per-bō-rē′ans), dwellers beyond Boreas or the North Wind, a name given by the ancients to a mythical people, whose land was generally supposed to lie in the extreme N. parts of the world. As the favorites of Apollo they enjoyed an earthly paradise, a bright sky, a perpetual spring, a fruitful land, unbroken peace, and everlasting youth and health. In the modern science of anthropology the term hyperboreans is sometimes used to designate certain peoples, such as the Tchuktchis, Aino, and Kamchadales, who dwell in the N. E. of Asia and the N. W. and N. of North America, and who cannot be classed either with the Indians or the peoples of the Asiatic plateau.

Hyperdulia, or **Hyperduly,** in Roman Catholic theology, a special homage rendered to the Virgin; a subdivision of dulia. This is an important point; if it be lost sight of, there is danger of forgetting that the Virgin Mary is a creature, and of putting her between creatures and God. The higher veneration given to the Virgin Mary as the most exalted of mere creatures, though, of course, infinitely inferior to God, and incomparably inferior to Christ in His human nature.

Hypericaceæ, or **Hypericinæ** (hī-per-ē-kas′-ē-ī), a natural order of about 300 known species, trees, shrubs, and herbaceous plants, widely distributed over the world, and in very different climates, but particularly numerous in North America. The species of *Vismia* yield a substance resembling gamboge. Many of the *hypericaceæ* belong to the genus *Hypericum*, or St. John's Wort.

Hyperides (hī-per′ē-dēz), an Athenian orator. He was a disciple of Plato and Isocrates, and the contemporary of Demosthenes, against whom he brought that accusation of bribery which procured his banishment. They were afterward reconciled, and met their tragic fate about the same time, Hyperides being seized in the temple of Ceres, and delivered up to Antipater, who caused him to be put to death, B. C. 322.

Hyperion (hī-pēr′-ē-on), a name for Apollo, a model of manly beauty.

Hyperion, a Titan; son of Uranus and Ge, and father of Helios, Selene, and Eos. Homer and later poets apply the name as a patronymic for Helios himself. Hence the attribute of beauty has been connected with the name, as in Shakespeare's "Hyperion to a satyr."

Hyperion, in astronomy, the name given to the 7th satellite of Saturn, discovered in 1848, at the Harvard Observatory by G. P. Bond. It is just outside the satellite Titan, and the considerable mass of the latter causes perturbations in the orbit of Hyperion, which have proved to be a difficult problem in celestial mechanics, and a unique case in the solar system. The perturbations give an apparently large eccentricity to Hyperion's orbit, and cause the apparent line of apsides to follow the conjunction points of Titan and Hyperion, in a direction contrary to the usual motion of this line.

Hypermetropia (hī-per-met-rō′pē-ä), far-sightedness; it is the opposite of myopia, or near-sightedness, and differs from presbyopia in being congenital.

Hypersthene (hī-pers-thē′nē), a rock-forming mineral which crystallizes in orthorhombic forms. It is an anhydrous magnesian silicate, containing a large percentage (15–24) of ferrous oxide with very little alumina. It is generally dark green or raven black in color, but has a pearly or metallic luster when fractured across the cleavage planes. This is due to the presence of very numerous minute brown scales of some foreign substance, which are arranged in lines along these planes. This mineral occasionally occurs massive, like hornblende, as in the island of St. Paul on the Labrador coast. It is met with also as an occasional constituent of some eruptive igneous rocks, as in certain andesites and porphyrites, and in plutonic rocks, such as gabbro.

Hypersthenite, a more or less coarsely crystalline igneous neck allied to gabbro. It is an aggregate of labradorite (felspar) and hypersthene, and is of plutonic origin.

Hypnotism, that which formerly was, that which, popularly, still is called "mesmerism," or, more exactly "animal magnetism," founded on a belief in a so-called "magnetic fluid" which is supposed to pass from operator to subject, has become recognized as hypnotism; and the power which the dormant condition of a hypnotized subject apparently lends to the operator, is no longer thought by the school of Nancy, to be the result, or the effect of a magnetic fluid emanating from the hypnotizer, but is clearly seen to depend wholly upon the suggestibility of the subject, the school of Nancy being now the sole source of opinions concerning the meanings, and uses of hypnotic suggestion, and Bernheim is its head. The actual foundation of modern hypnotic suggestion was discovered by Liébeault of Nancy, the famous "father of the therapeutic application of suggestion." After several years of practical experience in 1866, he wrote his first book on the subject. It was shelved and he was pronounced erratic. Hypnotism remained a curiosity and Liébeault's book was not reproduced till six years after Charcot, in 1878, began his studies in hypnotism. In 1884 Bernheim wrote his charming book on suggestion and this created a demand for Liébeault's book which then gave him his lasting reputation. He was Bernheim's teacher. Formerly a profound skeptic, Bernheim became unavoidably converted by seeing the results of Liébeault's application of suggestion to invalids. Bernheim was a clever clinical professor in the great hospital of Nancy and in his wards he convinced himself of the great value of hypnotic suggestion.

The word hypnotism is generally and largely misunderstood and misused. For example, if a person seems to be wholly influenced by another it is commonly said that he has been hypnotized. This is a great error. The word hypnotism means putting a person to sleep and means nothing else. If an individual seems to be subjected to another in the waking state it should be said that he is unduly influenced. He is not hypnotized. That would mean that he was asleep.

The means by which hypnotism is used is "suggestion." A person may be influenced by suggestion in the waking state, for suggestion is a great force in daily life. As connected with hypnotism, however, suggestion is the expression of an idea or combination of ideas which becomes impressed upon the mind of the somnolent subject to whom it is addressed. Conscious or unconscious results are sure to follow. This explanation sums up the meaning, use and results of suggestion as applied to hypnotism and the hypnotic state.

If a subject be awake he can, according to the strength of his will and desire control to a greater or lesser degree the effect of a suggestion which he has received.

In the hypnotic state this self-control is decreased in a degree corresponding to that of the increase of the degree of sleep. Nevertheless, if merely the first degree of hypnosis has been attained, the subject conscious of all he hears, may be influenced by the suggestion of the operator. In this way a vast amount of relief has been given to individuals who may claim that they have not been affected at all. In the hypnotic state there are nine sharply marked degrees of somnolence. In the first six degrees notwithstanding he has been perfectly quiet and

Hypnotism

apparently asleep, the patient remembers all that has been said. In the last three degrees the patient, on waking, remembers nothing. Strange as it may seem, however, a person may be more influenced by suggestion in the lighter degrees of sleep than in the more profound degrees, and vice versa. This is due to the patient's suggestibility. For example the writer treated by hypnotic suggestion a very severe and prolonged case of intemperance. The patient claimed that not for an instant had he been sleepy but he so responded to suggestion that from that day to this, a period of nine years, he has not once touched alcohol. He had been intemperate from boyhood. On the other hand a person may fall into profound sleep and yet not respond markedly to suggestion. Generally, however, if the subject be made to reach any degree of somnolency he can be relieved by suggestion. In the majority of cases the relief endures. In the popular mind exists the belief that this form of treatment is attended by danger, that the patient once hypnotized is thereafter under control of the operator, even at a distance, that the will is weakened, etc. This is all a mistake. No person can be hypnotized unless he be willing. No person can be hypnotized at a distance, unless by telephone, or if he be a good and willing subject, by letter; and the patient must first have been hypnotized by the operator at some previous time. Otherwise the operator cannot influence him at a distance in the slightest degree. The will is not only not weakened, but there is no other existing treatment which can so strengthen the will as can hypnotic suggestion. If any physician object to the treatment we know that this physician, however intelligent he may be in other professional matters, is ignorant of this method of relief. This treatment is not peculiarly useful in hysteria, as is commonly supposed, but has accomplished greatest benefit in all cases attended by bodily distress, neuralgia, dyspepsia, headache, disturbance of menstruation, pains of rheumatism, mental unrest, sleeplessness in particular, intemperance, opium habit, and all drug habits, vicious propensities, lack of mental vigor, fear, illusions, stammering, and wherever calmness has disappeared. In short it will give relief in many cases which it cannot cure. It can relieve, but cannot create. It can assuage pain for instance in heart ailments, while it cannot dispose of damages which the heart may have received.

It is an absolutely safe and beneficent form of aid. It may not always bring relief but never in the hands of a competent operator has it done harm. The patient will always choose the operator as he would choose a surgeon. The object of all reliable operators in the use of hypnotic suggestion is the relief of the patient and to the operator the treatment is a sacred thing.

The method of the operators of the school of Nancy is wholly verbal. The patient is talked to sleep and on waking he is delighted by the changes in himself which are apparent and he has become convinced of the agreeable effects of the treatment.

Formerly a bright object was held between and above the patient's eyes, and he was directed to fix his eyes upon it. This created sleep. But it was found that nervous distress was apt to follow this method, and it has been abandoned by followers of the school of Nancy. The rationale of the treatment is that a person whose mind is in a sleepy or sleeping condition offers no resistance to the suggestions of the operator and, just as in thirst, in the waking state, "the mouth waters," just as a woman blushes, because of a personal remark, or turns pale if a pistol be pointed at her, so the suggestions of the operator made to a sleeping person will follow a nerve path which is in accordance with the quality or nature of the mental impression created by the suggestion. In other words the suggestion is followed by changes in sensation, act or idea, on the part of the patient, which corresponds with the nature of the suggestion. Thus if a sleeping person be assured by the operator that he will lose his craving for alcohol, or opium, or cocaine, or, that his pain will cease, that he will sleep at night, that his nervous unrest will disappear, that his power of will or a mental concentration will increase, and so forth, in nine out of ten cases the desired result will follow. Lack of space forbids further mention of this phase of the subject.

Brief reference should be made to an influence, wholly unappreciated by the popular mind, which is exerted by what is nothing but suggestion. For example: The sick people who were aided by the "magnitized" tree of the Marquis of Perysegur thoroughly believed in the therapeutic power of the tree, and therefore were cured or relieved. This was suggestion. The benefit of the electro-magnetic belts and rings formerly so largely in vogue was derived from suggestion. The influence of the waters of Lourdes is due to suggestion. The benefits which occur from many, if not the majority of the medicines given by regular physicians, are due to suggestion and temporary unusual care of the health. Therefore, in the absence of better means they are wisely given.

The people who resort to these things thoroughly believe in their efficacy and this belief, acting through the mind, so influences the nerve and blood supply of the part or organ for which relief is sought, that the ailment passes away.

There are indeed scores of popular forms of relief which act wholly through the patient's mind and in themselves literally have no value. The effect of the mind cure and Christian Science is due to a weak form of suggestion, behind which an intelligent knowledge of anatomy, physiology and disease is wholly lacking. The results are owing to influences produced upon the minds of those who seek these forms of relief, which thus have accomplished a degree of benefit but are dangerous aids where serious disease exists. These forms of suggestion, exactly speaking, are auto- or self-suggestion, that is, a belief which creates a mental power over bodily ailments and which in a certain percentage of people is capable of large development.

The wise choice of a source of needed suggestion would be to seek it at the hands of a cultivated physician who is familiar with the application of suggestion to a somnolent patient.

With reference to causation of crime by means of hypnotic suggestion: few or no scientific men believe it possible. Habit is as strong as death. If a man's habit of mind be honest, no suggestion, sleeping or waking, can cause him to commit crime of any sort. If he be dishonest, naturally or by inclination, the suggestion would be unnecessary. In so far as physicians are concerned they are not interested in this phase of the subject because they use the treatment wholly as a means of relief and, as a class, physicians are reliable men who would not even attempt to misuse hypnotism any more than they would use ether for evil purposes. The so-called "laboratory crimes" that is, imitation of crime in the presence of the operator who suggests it, would not occur unless he were present. The subject simply feels safe under the direction of the operator and, as has been proved many times, would not attempt suggested wrongs if he were alone.

The hypnotic sleep is a natural sleep. Those who claim that it is not natural are not intelligent in the matter and their opinions are based upon pure and uninformed theory.

As has been shown by scores of thousands of cases, treated by brilliant and educated physicians, the treatment is absolutely innocuous. It either relieves or produces a neutral effect, and is useful in a multitude of ailments which baffle ordinary means of relief.

But the operator must be educated in the use of this valuable method of treatment. Hypnotism should be used only by physicians, and amateurs should by no means experiment with it as a means of amusement.

HAMILTON OSGOOD.

Hypnum, a genus of mosses belonging to the order *Bryineæ*. Archegonia and capsules are borne on special lateral branches. The sexual organs are formed in August and September, and the capsules take from 10 months to a year to ripen. Many species are remarkable for their beauty, and are often used for decorative purposes. Their distribution is universal.

Hypobromous Acid, HBrO, a solution of this acid can be obtained by shaking bromine water with mercuric oxide, HgO, and then shaking the yellow liquid successively with Br_2 and HgO; a liquid can thus be formed which contains 6.2 per cent. of bromine combined as hypobromous acid, $HgO+2Br_2+H_2O=2(HBrO)+HgBr_2$. It is a powerful oxidizing agent, and bleaches vegetable colors. Bromine added to milk of lime forms a compound resembling bleaching powder; it may be a mixture of $CaBr_2$ with hypobromite of calcium, $Ca(BrO)_2$.

Hypocaust, a form of furnace used by the Romans for the purpose of heating baths and apartments. It was placed in a chamber beneath the floor, and the heated air and products of combustion were made to circulate round the walls and under the floor by means of hollow tubes or a hollow lining, and were also carried in pipes to other rooms.

Hypochæris (hip-ō-kē′ris), a genus of plants of the natural order *Compositæ*, suborder *Cichoraceæ*, of which one species, *H. radicata*, or long rooted cat's ear, is extremely common in meadows and pastures in Great Britain. Its leaves spread on the ground, and resemble in form those of the dandelion, but rough; the stem is branched, the flowers not unlike those of the dandelion, but smaller. Cattle eat this plant readily, and its abundance is not deemed injurious to pasture or fodder.

Hypochlorous Acid, HClO, the acid contained in bleaching powder. It can only be obtained as a dilute solution, as in the concentrated state it is very liable to decomposition. It is a powerful bleaching agent, and forms a series of salts, hypochlorites, which also possess bleaching properties. The chief of these are the hypochlorites of lime and soda. The lime salt is the important constituent of bleaching powder, while the soda salt is prepared commercially by passing chlorine into a solution of soda. Hypochlorous acid has less oxygen than chlorous acid; hyposulphuric has less oxygen than sulphuric, but more than sulphurous acid. Hypophosphates are salts formed by hypophosphoric acid and a base.

Hypochondriasis (hip-ō-kon-drī′ä-sis), a disease characterized by extreme increase of sensibility, palpitations, morbid feelings that simulate the greater part of diseases, exaggerated uneasiness and anxiety, chiefly in what concerns the health. In extreme

cases it becomes a species of melancholia. The disease is intimately connected with, if not caused by, disorder of the digestive functions.

Hypodermic Injection, a forcing of some substance beneath the skin; a method adopted in medicine when the condition of the stomach or other organs renders the use of drugs by the mouth objectionable, or when rapidity of action is desired. The medicine is introduced by a small glass syringe fitted with a long, hollow, needle-shaped point of steel.

Hypogæic Acid (hip-ō-gā′ik), $C_{16}H_{30}O_2$. A monatomic fatty acid contained as a glyceride, together with palmitin and arachin, in the oil of the earthnut *Arachis hypogæa*. Hypogæic acid crystallizes from ether in needles which melt at 33°.

Hypogene, a name applied to rocks, believed by Lyell and his followers to have originated some considerable distance beneath the surface of the ground. He included under the designation igneous rocks like granite, and metamorphic ones like gneiss. He introduced the term hypogene to supersede the word primary, when it was found that some of the rocks to which the latter term was applied were posterior to many of the secondary rocks.

Hypophosphites, salts of hypophosphorous acid, especially certain medicinal salts, chiefly the hypophosphites of potassium, sodium, and calcium. They have been used with considerable advantage in disorders of the blood and the digestive organs, and have also been found of benefit in consumption, though failing to effect a cure.

Hypophosphorous Acid, $H_3 \cdot PO_2$, hydric hypophosphite. It can be obtained as a barium salt. By boiling phosphorus with barium hydrate, phosphuretted hydrogen escapes as a gas. On evaporation the salt separates out; by adding sulphuric acid till the barium is precipitated the acid is obtained, which can be evaporated till the temperature rises to 105°, and then placing it under a desiccator, a syrupy oil is obtained, which at a temperature below 0° forms a snow-white mass. When heated above 110°, it is converted into PH_3, and phosphoric acid H_3PO_4. It is a powerful reducing agent. If the free acid in excess be added to a solution of cupric sulphate, and then heated to 55°, it gives a red precipitate of copper hydride Cu_2H_2.

Hypophysis (-pof′i-sis), a disease of the eyelids, when hairs grow so much as to irritate and offend the pupil.

Hypostasis, in alchemy, the principle or element of anything; specifically, mercury, sulphur, and salt, which the alchemists deemed the principles or elements of all material bodies. In botany, the name given by Dutrochet to what is more commonly called the suspensor or suspensory cord of the embryo of an ovule.

Hyposulphites, salts of hyposulphurous acid. Among the most important are the hyposulphites of sodium and calcium, the former of which is used in medicine as an external remedy in parasitic skin disorders and an internal one in checking fermentation in zymotic diseases. It is variously used in bleaching, photography, and other arts as an antichlore, a dissolvent of bromide and iodide of silver, etc.

Hypothec (hip-oth′ek), a term in the law of Scotland, to denote a lien or security over goods in respect of a debt due by the owner of the goods. Thus, a law agent or attorney has a hypothec over the title-deeds of his client in respect of his account or bill of costs; and the landlord of agricultural subjects held under leases current Nov. 11, 1881, has a hypothec over the furniture or crops of his tenant for the current rent. The Hypothec Abolition (Scotland) Act, 1880, did away with the landlord's hypothec for the rent of all other land exceeding two acres let for agricultural purposes.

Hypothecation, in civil law, an engagement by which the debtor assigns his goods in pledge to a creditor as a security for his debt, without parting with the immediate possession; differing, in the last particular, from the simple pledge. In commerce, the pawning of a ship for necessaries, or to raise money in some critical emergency.

Hypothenuse, or **Hypotenuse,** the name given to that side of a right-angled triangle which subtends, or is opposite to, the right angle. Its property — that the square described on it is equal to the sum of the squares described on the other two sides — is demonstrated and generalized, so as to apply to any figure in Euclid. The discovery of this property is attributed to Pythagoras.

Hypothesis, etymologically a supposition, is popularly used to denote something not proved, but assumed for the sake of argument. In scientific and philosophical usage it denotes either a probable theory of phenomena not yet fully explained, or a strictly scientific theory which accounts for all the known facts of the case, and which only needs the verification of subsequent observations and deductions to become a certainty. Thus the conjecture of Newton that the force of gravity, as exemplified on the earth, might extend to the moon, was in its first stage a probable hypothesis; but when it was found to account for all the facts, it became a scientific hypothesis or theory.

Hypsipyle, the Queen of Lemnos, banished, according to the story, for saving her

father's life when all the men of the island were murdered.

Hypsistarians, a sect of heretics which existed in Cappadocia, in the 4th century; their leading principle was the recognition of God as the "Most High." Rejecting sacrifices, circumcision, pictures, and images they observed the Jewish Sabbath and Jewish distinctions as to clean and unclean food, and, like the Magians, used fire and lights as symbols of the Deity.

Hypsometry, that department of geodesy which treats of the measurements of the altitudes or relative heights of various points on the earth's surface. In all cases in which great accuracy is essential, trigonometrical methods must be employed, but in other cases sufficiently accurate results may be obtained by levelling, by the use of the barometer, or by the boiling point of water as given by the thermometer. The trigonometrical method is often the only one available, as the height to be measured may be quite inaccessible. The barometric method is based on the fact that as the mercurial column is supported by the atmospheric pressure, it must fall when conveyed from a lower to a higher level, as in the latter case the pressure is diminished. Were the atmosphere uniform in density throughout, nothing could be simpler than the measurement of heights by the barometer, but gases being very compressible, the lower strata of the atmosphere are denser than the upper strata, being exposed to greater pressure. Thus a column of air 100 feet high, has far greater weight at the sea-level than a similar column at the top of a mountain 4,000 feet high; and the effect on the barometric column of rising 100 feet from sea-level is correspondingly greater than the effect of rising 100 feet from a height of 4,000 feet above the level of the sea. Moreover, increase of temperature affects the density of the mercury in the barometer, and also that of the air, and further complicates the problem. Hence for the greatest accuracy in determining the difference of levels two mercurial barometers and four thermometers are required. Two of the thermometers are used for determining the temperature of the air at the stations, and two are attached to the barometers for determining the temperature of the mercury. The observations are made simultaneously. The aneroid barometer is in some respects more suitable than the mercurial, being much more portable, and requiring two thermometers only. After the necessary observations are made the required height may be calculated by the use of certain logarithmic formulæ. Tables obviating the use of logarithms are often supplied by instrument makers along with aneroid barometers. The method in which use is made of the principle that water boils at the temperature of 212° under the full pressure of the atmosphere but at a lower temperature with a smaller atmospheric pressure, such as is given by an elevated position, is simple and sufficiently accurate for many purposes. It has been found that if water at the sea-level boils at 212° on rising 510 feet it will boil at 211°, and so on.

Hyrax, a genus of pachydermatous mammalia, intermediate in their character between the rhinoceros and the tapir. It is the only genus of the order *Hyracoidea*,

HYRAX.

characterized by having no canine teeth, but long curved incisors. The front feet have four toes, and the hind feet three. The Cape hyrax is by the colonists of South Africa called rock badger and rock rabbit, from the fact that they inhabit rocky places. They are also called damans.

Hyrcania, an ancient district of Asia, of indefinite extent, bordered on the Caspian Sea (sometimes called Hyrcanum Mare) and the river Oxus. It corresponded with the modern Mazanderán and Asterabad.

Hyrcanus, Johannes, a high priest and prince of the Jews. He was son of Simon Maccabæus, on whose assassination he succeeded him as supreme ruler, 136 B. C. Jerusalem was soon after besieged by Antiochus Sidetes, King of Syria, with whom Hyrcanus was compelled to make a burdensome peace. In 131 he accompanied Antiochus in his expedition against the Parthians, and from a victory over the Hyrcanian tribe he acquired the surname Hyrcanus. Antiochus being killed during this war, Hyrcanus threw off the yoke of Syria, conquered Idumea, besieged and destroyed Samaria, and made an alliance with Rome. The last years of his reign were troubled by the dissensions of the Pharisees and Sadducees. He died 106 B. C.

Hyrcanus II., eldest son of Alexander Jannæus; became sovereign pontiff 70 B. C., was dethroned by his brother Aristobulus,

and restored by the Romans as a tributary prince in 63. He was beheaded by Herod, 29 B. C.

Hyria (hir'rē-ä), an Arcadian nymph, who so much bewailed the death of her father, who had thrown himself headlong from the top of a rock, that she dissolved away in tears, and was changed into a lake bearing her name.

Hyslop, James, a Scotch poet; born in Kirkconnel, Dumfriesshire, July 23, 1798. While acting as a shepherd near Airdsmoss, Ayrshire, the scene of a Covenanting skirmish and Cameron's death (1680), the traditions of the district stimulated his imagination to the writing of his best-known poem, "The Cameronian's Dream" (1821). While tutor on board the man-of-war "Tweed" he died of fever in St. Jago, Cape Verd Islands, Nov. 4, 1827.

Hyssop, a genus of plants of the natural order *Labiatæ,* distinguished by four straight diverging stamens, and a calyx with 15 ribs. The known species are few. The common hyssop (*H. officinalis*) is a native of the S. of Europe and the East. It is found on the Alps of Austria. It is a half shrubby plant, about 1½ feet high, the upper part of the stems quadrangular, the leaves evergreen and lanceolate, the flowers in one-sided whorled racemes. The flowers are generally of a very beautiful blue. It has an agreeable aromatic odor. It has long been in cultivation for the sake of its leaves and young shoots, which are sometimes used for culinary purposes as a seasoning, but more generally in a dried state as a stomachic and carminative. A syrup made with them is a popular remedy for colds. The virtues of hyssop depend on a volatile oil. The hyssop of the Bible has been supposed to be some species of *Phytolacca* as *P. acinosa,* a native of the Himalaya; but on the authority of Royle it appears to have been the common capers.

Hysteresis (his-ter-ē'sis), an indisposition to change from a condition previously induced, a phenomenon of magnetization of iron. It may be attributed to a sort of internal or molecular friction, causing energy to be absorbed when iron is magnetized. Whenever, therefore, the polarity or direction of magnetization of a mass of iron is rapidly changed, a considerable expenditure of energy is required. It is attributed to the work done in bringing the molecules into the position of polarity.

Hysteria (his-ter'ĕ-ä), a nervous disorder of females, usually most frequent at the catamenial period and in the unmarried. Indolent and luxurious habits, over-spoiling, disappointed affection, grief, etc., are among the chief causes. The symptoms are innumerable, and the imitation of other diseases allied to it endless. In many cases, owing to a real defect of will and mental power, the symptoms are extremely distressing, and the bodily health very indifferent, with great eructation of gas and copious discharge of pale urine, extreme spasmodic action, *globus hystericus,* shrieking, laughing sobbing, etc. The remedy for all this is undoubtedly mental and moral treatment, change of scene and associations, with general care of the bodily health, particularly as regards diet and the digestive organs, and strict avoidance of alcoholic stimulants.

Hystero-epilepsy, a nervous disease of women, occurring during the fertile period of life, first observed and described by Charcot. Its phenomena are very extraordinary, and serious doubts have been entertained by eminent authorities as to their substantiality, it being asserted that they are merely manifestations of ordinary hysteria, intensified by a process of education. But these doubts are being rapidly dissipated by the observations of competent observers. The disease is of a paroxysmal nature, and its symptoms may be divided into inter-paroxysmal and paroxysmal. The former consist of extreme sensitiveness over the region of one or (less frequently) both ovaries, and loss of tactile sensibility and complete insensibility to pain in one lateral half of the body, the side on which ovarian tenderness exists. Sight is sometimes implicated, manifested by a peculiar form of color blindness. Perhaps the most remarkable phenomenon presented in this disease is that all these impairments of sensation may be shifted to the other side of the body on the application of magnets and plates of metals, the originally affected side regaining sensibility so long as the opposite one is insensible. In some cases the symptoms are permanently bilateral. The paroxysm consists in violent general convulsion, epileptiform in character, which is at once checked by pressure over the tender ovary. The mental faculties are generally weakened and the disease is for the most part incurable.

Hythe, one of the Cinque Ports of England. In 1295 the French made a descent on Hythe, but were decisively repulsed, and later on, toward the end of the reign of Richard II., the town was visited with a threefold calamity, a fire having destroyed 200 houses, a pestilence carried off numerous inhabitants, and an unusually heavy storm caused a severe loss of men and ships.

I

I, the ninth letter in the English alphabet, and the third vowel. The English language is the only one which denotes, by this same character, the two totally different sounds of ī as in pine and ĭ as in pĭn. In all other languages of Western Europe the letter has the sound of i in pin (nearly) and ee in beef, which is practically the same vowel, only in the former case short, in the latter long. Those languages which have the sound i in pine express it by a diphthong; for instance, the German by ei and ai; the Dutch by ij; and it is in fact a real diphthong. In Latin the characters i and j were used interchangeably, both having the same vowel sound. The sound of our j did not exist in Latin, though sometimes the character had almost a consonantal force, as in *Ianus* (Janus), *Iulius* (Julius), *conciicio* (*conjicio*). With the propagation of Christianity the Latin alphabet became, in many respects, the model of others and this peculiarity of it was also adopted by most of them; so that even after two different signs (the i and j) had been adopted for the two different sounds, words beginning with i and j nevertheless long continued to be mixed together in dictionaries; but the fact that they are distinct in nature (though nearly akin) and have distinct characters, sufficiently authorizes us to separate them. In many languages i is found as the final vowel of several diphthongs; as in German, ei, ai; in French, ai, oi, ui, etc.; and these sounds at last actually become one. In the Greek, the i (iota) was always a vowel. It derived its name from the Hebrew Jod, which, as it was the smallest letter in the alphabet, came to be the synonym for a trifle. The term iota is also used in the same sense. As a numeral, iota signified 10; with a little line under it, 10,000. The Romans used I to signify one, and they continued to count with it up to four, (I, II, III, IIII). The Roman I, put before a V, takes away the value of one; hence IV is equal to four; placed after V it adds one; hence VI is equal to six. The dot over the i originated in the 14th century. I on Roman coins was the mark of the *as* in value and weight. As an initial letter it stands for *infra, imperator, imperii, indulgentia, invictus,* etc. There is a French proverb of a person occupied with trifles — "*Il met les points sur les i*" (he is dotting his i's).

I, used not as letter of the alphabet, but as a personal pronoun, denotes, in its more immediate sense, the subject which in all the varieties and changes of the mental states remains ever the same — the personal identity, the individual person whose state and activity is all that every one finds in his own consciousness. It makes itself known as the real and active agent in the multiplicity of the mental phenomena; and this kind of self-apprehension is so natural to man that the expression "As sure as I live" is regarded as one of the strongest asserverations of reality; it is besides so familiar that the idea of self or self-consciousness is never lost and never requires to be suggested. The popular psychology has accordingly been long contented to explain it after the analogy of the external senses by assuming the existence of an inner sense, by which we perceive our individual circumstances and actions to be truly our own; and even in Kant what he calls the "synthesis of apperception," or, in other words, the activity of the inner sense, is regarded as an act or rather function of self into which consciousness always enters as a condition. The more recent philosophy has made the idea of personality the subject of very profound investigations, and the philosophy of consciousness has been treated with much subtlety by Professor Ferrier. If the answer to the question, What am I? is borrowed from empirical consciousness, it tells us of a subject temporarily existing, changeable, and susceptible of new additions and transformations; the I is this definite individual existence with these definite opinions, inclinations, characteristics, etc., and this I is different for each. Every one ascribes to himself this share in the I, and the true idea of what is contained in it cannot lie in those manifestations of individual personality. It is necessary therefore to separate the pure and simple I, or Ego — in other words, the idea of I cleared of all foreign additions — from what is merely empirical. The merit of having brought out

this distinction is due to Kant, and the distinction holds a very prominent place in the system of J. G. Fichte.

Iacchus (yak′us), the Eleusinian name of Bacchus.

Iago (ē-ä′gō), the villain in Shakespeare's "Othello." He causes the death of Desdemona by his falsehoods.

Ialysus (yal′ē-sus), a city of Rhodes, founded by the Phœnicians. Its history goes back to about 1300 B. C. and it is alluded to by Pindar.

Iambic (ē-am′bik or ī-am′bik), in prosody a foot consisting of one short and one long syllable, or one unaccented and one accented. The iambic meter having been originally, according to Aristotle, employed in satirical poems, the term "iambics" came to be used as equivalent to a satire or lampoon.

Iamblichus, an eminent philosopher, native of Chalcis in Cœle-Syria, who flourished in the beginning of the 4th century. He was the pupil of Anatolius and of Porphyry, and having become perfect in the mysteries of the Plotinian school, he taught with vast reputation. He professed to perform wonders by the aid of invisible beings. His writings discover extensive reading, but his style is inelegant and he borrows freely, especially from Porphyry. The school of Iamblichus produced many eclectic philosophers, who were dispersed throughout the Roman empire. The philosophical works of Iamblichus now extant are the "Life of Pythagoras," evidently written against Christianity; an "Exhortation to the Study of Philosophy"; "Three Books on Mathematical Learning"; a "Commentary upon Nicomachus' Institutes of Arithmetic," of which the fifth and sixth books are lost; and a "Treatise on the Mysteries of the Egyptians, Chaldeans, and Assyrians." His authorship of the "Mysteries" has been disputed, but not on sufficient grounds. St. Jerome states that he also wrote a copious commentary on the golden verses of Pythagoras. He died in Alexandria about 333. This Iamblichus must be distinguished from the person of the same name to whom the Emperor Julian dedicates his epistles, for Julian was scarcely born when the successor of Porphyry died. English translations of the "Treatise on the Mysteries" and of the "Life of Pythagoras," by Th. Taylor, were published, the former in Chiswick in 1821, and the latter in London in 1818.

Iambus, in prosody, a foot of two syllables, a short and a long one (˘ ¯). In Latin the iambic verse consists of four, six, or (in the comic writers) even of eight feet. The odd feet, that is, the first, third and fifth, may be iambuses, spondees, anapæsts, dactyles, or tribrachs (but never trochees). The even feet, however, or the second, fourth, and sixth must be iambuses. The more iambuses there are in the verse the more beautiful it is considered. An iambic verse of four feet is called a quaternarius; one of six a senarius; one of eight an octonarius. The German language having a prosody, has of course the iambus, and makes great use of it in poetry. The iambic meter is also the fundamental rhythm of many English verses, as our language runs easily and naturally in iambics.

Ian Maclaren. See WATSON, JOHN.

Ianthe (ī-an′thē), in mythology, a girl of Crete, who married Iphis; one of the Oceanides; one of the Nereides.

Ianthina (ī-an′thē-nä), in zoölogy, violet snail; a genus of mollusks, family *Halidotidæ*. The shell is thin, translucent, trochiform; the aperture four-sided; the animal with a large head, muzzle-shaped, with a tentacle and an eye-pedicel on each side, but no actual eye. Four species are known, all recent, from the Atlantic and the Coral Sea. *Ianthina fragilis* is found in nearly every sea, and has helped to extend the range of other species parasitic on its shell.

Iapetus (yap′ē-tus), regarded by the ancient Greeks as the father of the human race, son of Uranus and Ge, and father of Atlas and Prometheus, is supposed to be the Japleth of Genesis. In astronomy, the name given to the eighth or outside satellite of Saturn, discovered in 1671 by J. D. Cassini. It revolves round Saturn in a period of about 79 1-3 days. Unlike all the other seven satellites which revolve in planes nearly coincident with the ring of Saturn, making an angle of about 28° with the plane of the ecliptic, the plane of Iapetus's orbit makes an angle of only 18° or 19° with the ecliptic.

Iapyx (yap′ix), a mythic colonizer of Southern Italy.

Iarbas (yar′bas), the King of Gætulia, who sold to Dido the land on which she built Carthage. He wished to marry that princess, but she, rather than consent, killed herself. Vergil in his "Æneid," says that Irabas was defeated by his rival Æneas, and that Dido did not kill herself till she had been abandoned by the latter.

Iasion, or **Jasion** (yā′sē-on), a son of Jupiter and Electra, one of the Atlantides. He reigned over part of Arcadia, where he diligently applied himself to agriculture. He married the goddess Demeter, or Ceres, by whom he had two sons, Philomelus and Plutus, to whom some have added a third, Corybas, who introduced the worship and mysteries of his mother in Phyrgia. He had also a daughter, whom he exposed in a forest as soon as born; but the child was suckled by a she bear, and afterward rendered herself famous under the name of Atalanta. Iasion was killed with a thunder-

bolt by Jupiter, and, after his death, ranked among the gods by the inhabitants of Arcadia.

Iaspis, the jasper of the ancients. It included, in Pliny's time, all bright colored chalcedony, except the carnelian.

Iatro Mathematician, one of a school of physicians who arose in Italy about the middle of the 17th century. They attempted to explain the mechanism and action of the human body on hydraulic and mechanical principles, making use, for the purpose, of mathematical calculations. Called also mechanicians.

Ibach, Lawrence J., an American astronomer; born in Allentown, Pa., Oct. 9, 1838; learned the blacksmith's trade and followed it throughout his life in Lebanon co., Pa. He was first taught mathematics and astronomy by a French gentleman; studied later with the astronomer, Charles F. Engleman, who, on his death in 1860, bequeathed all his charts, books, and instruments to Ibach. His benefactor had promised to make several series of astronomical calculations for almanacs which now fell on him. In 1863 he filled the first order and thereafter till his death made annual calculations for almanacs in the United States, Canada, South America, and Cuba. He translated his calculations into four languages in 1875. The fact that he worked at the forge during the day and studied astronomy at night won him the sobriquet "blacksmith-astronomer." He died in Newmanstown, Pa., Oct. 9, 1888.

Ibague, or **Ibaque** (ē-bä′gä), a town of the Republic of Colombia, department of Cundinamarca, about 70 miles W. of Bogota. Pop. (1904) est. 6,750.

Ibea, a name vaguely applied to British East Africa or the East Africa Protectorate.

Iberia (ib-ē′rē-ä or ī-bē′rē-ä), in ancient geography: (1) A fertile district in Asia, between the Euxine and Caspian seas, which consisted of a plain surrounded by mountains, a part of modern Georgia. (2) An ancient name of Spain, from its river, the Ibērus (Ebro). The Iberi or Iberians, probably the most ancient European nation, formed the basis of the population of Italy, Gaul, Spain, and Lusitania (Portugal). Their language still lives in the Basque. The Celts, who entered the country later, were intermingled with them, the conjoined people being called Celtiberians.

Iberis (ī-bēr′is), candy-tuft; a genus of cruciferous plants, family *Thlaspidæ*. The pouch is emarginate, the valves keeled and winged, the cells one-seeded, the petals unequal. *I. amara*, the bitter candy-tuft — a plant with white or purplish flowers.

Ibernia. See HIBERNIA.

Iberus (ī-bē′rus), a river of Spain, now the Ebro, which formerly separated the Roman from the Carthaginian possessions in that country; also a river of Iberia, in Asia, flowing from Mount Caucasus into the Koor.

Iberville, Pierre le Moyne, Sieur d' (ē-bā-vēl′), a French-Canadian naval and military commander; born in Montreal, July 16, 1661. At the age of 14 he entered the French navy; led an expedition against Schenectady in 1690; was given command of a frigate in 1692; and took Forts Nelson and Bourbon, on Hudson Bay, in 1694 and 1697 respectively. In 1699, by order of the French government he built Fort Biloxi at the head of Biloxi Bay, the first post on the Mississippi river. He afterward established other posts in the same region and was preparing to attack the coast of North Carolina, when he died in Havana, Cuba, July 9, 1706.

Ibex (ī′bex), a wild goat, or rather several species of wild goats, the best known of which is the common ibex (*Capra ibex*). It is the ibex of the ancient Romans, the

IBEX.

steinbock of the Germans, and the bouquetin of the French. The adult male is about five feet long from nose to tip of tail, and two feet eight inches high at the shoulder. The horns are flat, with two longitudinal ridges at the sides, crossed by numerous transverse knots; they are sub-vertical, curved backward, dark in color. The hair is red-brown in summer and gray-brown in winter, the beard short and dark, the inside of the ears and under part of the tail white. The general color of the female is earthy-brown and ashy. The young are gray. It inhabits the highest regions of the

Alps. An analogous species, the *C. pyrenaicus*, is found on the Spanish side of the Pyrenees. Three other species are found upon the Asiatic, and two more on the Abyssinian and Nubian mountains.

Ibicui (ib′i-kwē), a river of Brazil, which rises in the Serra de Santa Anna, province of Rio Grande do Sul, and joins the Uruguay at Yapeyu after a course of 400 miles.

Ibigau (ib′ē-gō), a very large goat-sucker inhabiting South America; sometimes called the grand goat-sucker.

Ibis, a genus of *Tantalinæ*. The bill is long, cylindrical, and arched from the base; the head naked; the wings broad, ample, the second and third quills longest; the plumage metallic. The sacred ibis was venerated among the ancient Egyptians, who preserved its remains as mummies, and represented it upon their monuments. It is about the size of a hen, the plumage white, with the end of the wing feathers black, the last coverts with elongated loose barbs, black with violet reflections; bill and feet black, as is the naked part of the head and neck. It is found through Africa. It is the *Abou hannes* of Bruce. The scarlet ibis is abundant on the banks of the Amazon, and in many other parts of South America.

Iblis, in Arabian mythology, Satan, and the father of the sheytans, or devils.

Ibn Batuta (ibn bä-tö′tä), an Arab traveler and geographer, whose proper name was Abu Abdullah Mohammed; born in Tangiers in 1304. He spent 30 years (1325–1354) of his life in travel. Settling at Fez, in Morocco, in 1354, he wrote the history of his journeys. The course of his travels led him first to Mecca, then to Persia, Mesopotamia, Arabia, the E. coast of Africa, Asia Minor, the Caspian regions, Khwarizm, Bokhara, Afghanistan, and India; thence he proceeded to China by way of Sumatra, and finally came home to Fez in 1349. But his journeys were not yet done. He visited Southern Spain, and then traveled as far as Timbuktu on the Niger. His narrative is extremely interesting, humor and anecdote alternating with graphic description and through it all runs the thrèad of the writer's naïve personality. He died in Fez, in 1378.

Ibn Esra (ibn ez′rä), properly Abraham ben Meir ibn Esra, a Jewish writer and scholar; born in Toledo, about 1092. He traveled extensively, studying poetry, grammar, mathematics, astronomy, and philosophy. He wrote a Hebrew grammar, was one of the earliest critics and commentators on the Bible and composed hymns largely used in the Jewish liturgy. He died in 1167.

Ibn Khaldun Abderrahman (ibn khäl-dön′), an Arabic historian; descended from a noble family of Seville; born in Tunis in 1322. He occupied high official positions at the courts of various Mahometan princes, and is considered the greatest of Arabic historians, his chief work being a history of the Arabs and Berbers in several volumes, with a philosophical introduction to the science of history. He died in Cairo, in 1406.

Ibn Koteiba, Abdallah ibn Muslim, a noted Arabic philologist and historian; born in Bagdad, in 828. He composed, among many other things, a "Handbook of History," brought out in a German translation in 1850; a work on "The Art of Poetry"; and "Contributions to the Knowledge of Poetry among the Old Arabs." He died in Bagdad in 890.

Ibn Roshd. See AVERROES.

Ibn Sina (ibn sen′ä), an Arabic philosopher; known also as Avicenna; born in Afshena, Bokhara, in 980. His works number over 100. He died in 1037. Whewell says of him:

"Avicenna (Ibn Sina) was at once the Hippocrates and the Aristotle of the Arabians; and certainly the most extraordinary man that the nation ever produced. In the course of an unfortunate and stormy life, occupied by politics and by pleasures, he produced works which were long revered as a sort of code of science. In particular his writings on medicine, though they contain little besides a compilation of Hippocrates and Galen, took the place of both even in the universities of Europe; and were studied as models at Paris and Montpellier till the end of the 17th century, at which period they fell into an almost complete oblivion."

Ibn Tofail (ibn tō-fīl′), an Arabic philosopher and physician; flourished toward the close of the 12th century in one of the Spanish dominions of the Moors. His most celebrated work is a philosophical romance bearing the title "The Improvement of Human Reason Exhibited in the Life of Hai Ebn Yokdhan," which has been translated into Hebrew, Latin, and English.

Ibn Yunis, Ali Ben Abdel-Rahman, an Arabian mathematician and astronomer; born in 979. He lived at the time when astronomy was being kept alive and cultivated by the Arabs only. His observations were made near Cairo, and his publications consist of a set of astronomical tables, and of observations of solar and lunar eclipses, some of which are important today from their bearing on the theory of the moon's motion. He died in 1008.

Ibrahim (ib′rä-him), the son of Massoud, 18th caliph of the dynasty of Gaznevides, succeeded his brother Ferokzad. He reigned 42 years, during which time he erected a number of cities, mosques, and hospitals; he was also a liberal encourager of arts and letters. He died in 1098.

Ibrahim, the son of the caliph Mahadi, brother of Haroun-al-Raschid, and uncle of Amin and Mamon. He was an excellent poet and musician, and the first orator of

his time. He was proclaimed caliph at Bagdad, on the death of his nephew Amin, in 817; but Mamon marching from Khorassan to Bagdad with a powerful army, Ibrahim thought it prudent to abdicate the throne. He died in Samara in 839.

Ibrahim, Emperor of the Turks, son of Achmet; succeeded his brother Achmet IV. in 1640. He besieged and took the capital of Candia from the Venetians, in 1644; but his cruelties and debaucheries were so great that the soldiers strangled him in 1649.

Ibrahim Bey, a Mameluke chief, vanquished by Mehemet Ali in 1805. He died in 1816.

Ibrahim of Aleppo, an Ottoman writer on jurisprudence; born about 1490. He compiled the great code of laws known as "Multeka-al-Abhar" (Confluence of the Seas). He died in 1549.

Ibrahim Pasha, a viceroy of Egypt; born in Cavella, Albania, in 1789. He was stepson and successor of Mehemet Ali. In 1819 he became generalissimo of the Egyptian army. In the course of a few campaigns he completely defeated the Wahabees in Arabia, who from 1818 to 1824 had resisted all the efforts of the Egyptian forces to subdue them. He invaded the Morea at the head of an Egyptian army in 1825, with the view of reducing it under the power of Mehemet Ali; but the intervention of the Powers in the affairs of Greece compelled him to abandon this enterprise in 1828. Mehemet Ali having conceived the design of adding Syria to his dominions, Ibrahim crossed the Egyptian border with an army in October, 1831, took Acre by storm, and quickly made himself master of the whole of Syria. A peace was concluded on May 4, 1833, the Turks not only consenting to give up Syria, but also making over Adana to Ibrahim personally, on a kind of lease. When war broke out again between Mehemet Ali and the Sultan in 1839, Ibrahim was again successful, totally routing the Turks in the great battle of Nisib on June 24. The interference of the great Powers eventually compelled him to relinquish all his Syrian conquests, and to return to Egypt. In 1848 he went to Constantinople, and was installed by the Porte as viceroy of Egypt; but he died in Cairo, Nov. 9, 1848.

Ibsen, Henrik (ib'sen), a Norwegian novelist and dramatist; born in Skien, Norway, in 1828. His youth was passed in extreme poverty. At 16 he left school and became an apprentice in a drug store at Grinstad, intending ultimately to study medicine at the University of Christiania. At 22 he went to Christiania and entered the school of Heltberg, where he was a comrade of Bjornson. He made several unsuccessful literary attempts, abandoned medicine, and finally, in 1851, was appointed by Ole Bull director of the National Theater at Bergen. His attention was thus turned permanently to dramatic writing. In 1858 he became artistic director of the Norwegian Theater at Christiania. His best known dramas are "The Doll's House," "Brand," "Hedda Gabler," "Ghosts," and "Pillars of Society." His plays are much admired. He died May 23, 1906.

HENRIK IBSEN.

Ibycus (ib'ē-kus), a Greek lyric poet; a native of Rhegium, in Italy, flourished about 540 B. C., and lived some time at the court of Polycrates, tyrant of Samos. According to the legend he was slain by robbers near Corinth, and dying called upon a flock of cranes that he saw flying overhead to avenge him. The cranes went and hovered over the theater at Corinth, where the people were assembled. One of the murderers, seeing them, exclaimed involuntarily, "Behold the avengers of Ibycus." This led to an inquiry, and to the conviction of the guilty. The story is best told in Schiller's beautiful ballad. Ibycus wrote chiefly erotic poetry.

Ibzan, the 10th judge of Israel, in 1182 B. C. His property is marked by the great number of his children (30 sons and 30 daughters), and his wealth by their marriages — for they were all married.

Ica (ē'kä), a government department of Peru; area 8,718 square miles; pop. (1896) 90,962. It is well watered, fertile and of growing importance.

Ica, (ē-sä'), a river rising in Colombia and flowing about 1,000 miles through Colombia, Ecuador, and Brazil. It empties into the Amazon.

Icarian Sea (ē-kar'ē-an), a portion of the Ægean Sea, near the islands of Myconus and Gyarus, and by some supposed to be named for Icarus, who fell into it and was drowned. It extended from Chios to Cos, where the Carpathian sea began.

Icarius, in Greek fable, a pupil or friend of Dionysus, who taught him the culture of the grape.

Icarus (ē-kar′us), in Greek legend, a son of Daedalus, who with his father fled with wings from Crete to escape the resentment of Minos. His flight being too high proved fatal to him, for the sun melted the wax which cemented his wings and he fell into that part of the Ægean sea which bears his name.

Ice, water in solid form. The color of pure ice is deep blue or green, only discernible when it is in large masses; it is best seen in the clefts of a glacier or of an iceberg. It is specifically lighter than water which is just about to freeze, and therefore floats in it. Water, in becoming solid, expands about 1-11th in volume or bulk, and

ICARUS AND DAEDALUS.

thus acquires a density equal to 0.91674 (water at 0° C. 1.00). The formation of ice takes place generally at the surface of water. This is owing to the peculiarity that, when water has (at the ordinary atmospheric pressure) cooled down to within 3.9° C. of freezing, it ceases to contract as it did before with increase of cold, and begins to expand till it freezes (see Heat). In some instances, not very well explained, ice forms at the bottom of rivers and is called ground-ice or anchor-ice.

Water in ordinary cases freezes at the degree of temperature marked 0° on the Centrigrade and Réaumur's thermometers and 32° on Fahrenheit's, but if it is kept perfectly still it may be cooled to nearly 5.5° C. below freezing (22° F.) and still remain liquid. The least shake, however, or throwing in of a solid body, makes a portion of it instantly freeze, and its temperature rises to 0° C. Sea-water, and salt water in general, freezes at a lower temperature than pure water; in doing this, part of the salt separates, and the ice when melted, gives water that is fresher than that on which the ice was formed. In order to melt a pound of ice it is necessary to communicate to it as much heat as will raise 80.025 pounds of water 1° C. This measures the "latent heat" of ice: the temperature does not rise till the ice has been melted. The expansion of water on its conversion into ice often gives rise to the exhibition of very great force, and produces remarkable effects in nature. Much of the disintegration observed in rocks and stones during or immediately after frost is due to it, water having entered into their pores and cavities and burst off particles by its expansion. In the neighborhood of the poles, and on mountains of a certain height in all latitudes, there exist immense masses of permanent ice; and even in some districts of Siberia, where a kind of culture is practicable in summer, there are found, at a certain depth below the surface of the earth, strata of ice, mingled with sand. In sinking a well at Yakutsk, the soil was found permanently frozen hard to the depth of 382 feet, and consisting in some parts entirely of ice. Nansen and Peary discovered that the entire surface of Greenland, except the mountainous coasts, is covered with the largest ice-cap known to exist, having a supposed depth of several thousand feet. It is only near the outer edge that the spreading mass has crept around instead of covering the hills. The W. coast of Greenland produces most of the icebergs that float in the North Atlantic. From the polar icefields and glaciers which are always protruding themselves into the sea, great floating masses become detached and form icebergs, floes, and drift-ice (see Glacier). These bergs or mountains of ice rise sometimes 250 feet above the sea-level. They present the appearance of dazzling white chalk-cliffs of the most fantastic shapes. Fresh fractures have a green or blue color. From the specific gravity, it is calculated that the volume of an iceberg below the water is about nine times that of the protruding part. Icebergs, and floes or icefields, are often laden with pieces of rock and masses of stones and detritus, which they have brought with them from the coasts where they were formed, and which they often transport to a great distance toward the equator. These floating masses of ice are dangerous to navigation. The ice-foot is the belt or fringe of ice along the shores in arctic regions.

Faraday first called attention to a remarkable property of ice, since called regelation. Two slabs of ice, with flat surfaces, placed in contact, unite into one mass even though the temperature of the sur-

Ice

rounding air be considerably above the freezing point. J. Thomson theoretically predicted from the experimental fact of its expanding in the act of freezing, and Sir W. Thomson demonstrated by means of the piezometer, that the freezing-point of water, or the melting-point of ice, is lowered by pressure to the extent of 0.0074° C. for every atmosphere. By the application of pressure it can be molded into any form. This characteristic of plasticity was discovered by Forbes, who explained by it the motion of glaciers.

Ice Trade and Manufacture.—The trade in ice is now one of great and increasing importance. Ice has come to be more and more largely used in preserving provisions, both in refrigerating chambers and otherwise. It is also very largely used by brewers. In surgical operations it is used to produce partial anæsthesia; it serves in fevers to cool the mouth and reduce the internal temperature, while ice in bags, applied to the spine, is found helpful in many cases of sea-sickness, and in other applications.

In the United States the ice harvest is gathered in on an enormous scale, and with an elaborate system of apparatus. The ice is cleared from snow by means of an implement called the snow-plane. An ice-plow, drawn by horses, and driven by a man riding on it, or propelled by steam, is then made to cut deep parallel grooves in the ice, and these are again crossed by other grooves at right angles, so that the whole of the surface is deeply marked out into small squares measuring a little more than three feet. A few of these square blocks being detached by handsaws, the remainder are easily broken off with crowbars, and floated away to the ice storehouses, which are usually built of wood, on the borders of the lake or river. A zigzag line beginning at the N. E. corner of Rhode Island and continuing W., S. W., and then N. W. to the shores of Lake Erie, then in a generally S. W. course to Utah and Southern California, and ending at Puget Sound after turning sharply N. through California, Oregon and Washington marks the N. limit of "artificial" ice manufacture in the United States. Above it is an extensive area in which natural ice can still be harvested and marketed at considerably less cost than ice can be made by machinery. It includes all the four N. New England States, nearly all of New York, a small portion each of Ohio and Indiana, most of Iowa, Nebraska and Colorado, a part each of Utah, Arizona, California, Oregon and Washington, and all of Montana, Idaho, Wyoming, the Dakotas, Minnesota, Wisconsin, and Michigan. Nevada may be divided territorially into about two equal parts in one of which natural ice predominates, in the other the manufactured product. There is a middle zone across the country wherein both natural and manufactured ice are sold in competition with each other; but in practically all the territory S. of a line drawn W. through the N. boundary of North Carolina the lower cost of manufactured ice has made its monopoly complete.

Ice can be made at a cost as low as 50 cents per ton; that is only under exceptional conditions, however. It oftener costs from 70 to 90 cents per ton to manufacture it; and for the census year 1900 the average cost throughout the country for all seasons of the year was somewhere between $1.10 and $1.50 per ton. Since 1890 the process of manufacture has been very materially reduced; it is still being gradually cheapened.

Natural ice can be harvested at times for from 25 to 30 cents per ton — not often, however. The cost depends so largely on the weather conditions during the process of formation, the resultant thickness and weather conditions during the cutting and housing that the margin between minimum and maximum cost is very wide and almost as variable as the average winter weather itself. Under average conditions, as these might be determined covering a period of 15 years, the cost of harvesting and storing natural ice has probably been below 80 cents a ton more often than it has been above it; but transportation to market is a considerable factor in the cost to the wholesaler, because most ice fields are at a distance from the centers of consumption — a condition that hardly applies at all to manufactured ice, which generally goes right from the factories into the retail carts.

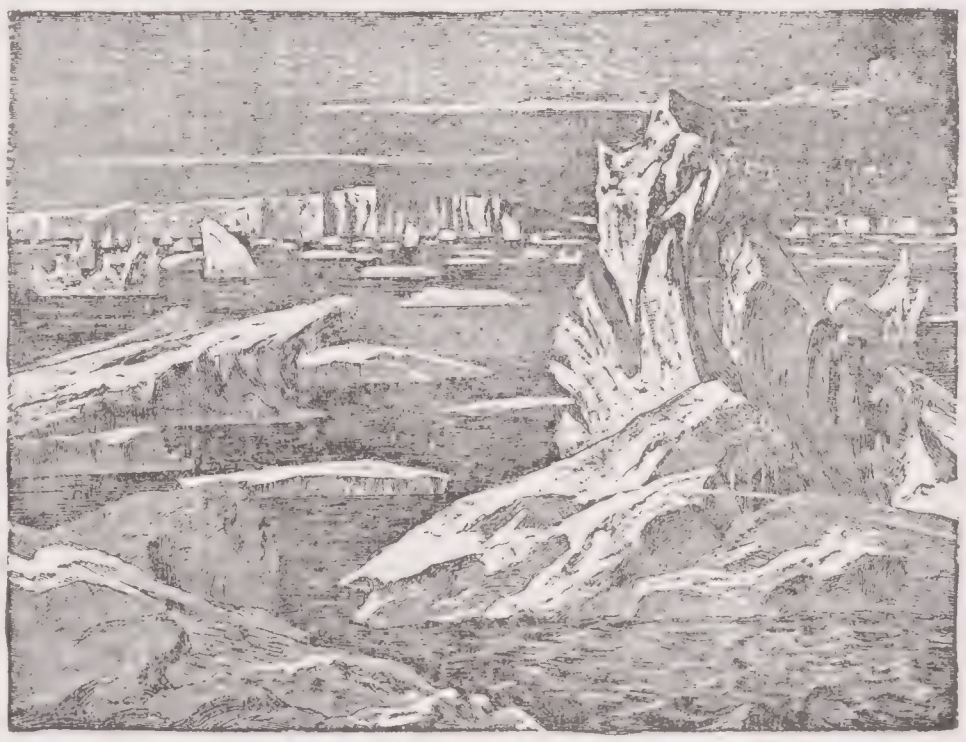
It is a significant fact, however, that in very recent years natural ice has been entirely excluded from the S. zone before referred to, and the competitive zone has moved steadily N. into the area that might easily be imagined as possessing a climate so suited to the production of natural ice that the latter could never be displaced in the market. There is every reason to believe that this competitive zone will continue moving N., as the cost of manufacturing ice is gradually reduced. With ice factories already in Rhode Island and Connecticut, why should not Massachusetts sooner or later make a great deal of her ice by machinery — or even Vermont, New Hampshire, and Maine?

Ice, Artificial, ice frozen by mechanical or chemical means. It has the great advantage of being easily rendered chemically pure, and it can be manufactured in the hottest countries. Its commercial value in the preservation and transportation of meats, fruits, etc., and for other purposes, can scarcely be estimated. Chicago has a large and perfectly equipped plant for the production of artificial ice. No chemical

of any kind is put into the water or allowed to come into contact with it in any part of the process of purification, and every pipe and vessel through which it passes is lined with a substance incapable of imparting the slightest taint or contamination. The object is to free the ice from every trace of foreign substance, solid or gaseous, and to reduce it to a condition of absolute purity. The water is first boiled and allowed to settle. It is then distilled, boiled again and run through three kinds of filters. Underneath the great square middle space of the freezing room, which is paved with large rectangular removable tiles, is a series of tanks. These contain a strong solution of brine, and through it run scores of pipes which are charged with liquified ammonia gas. When this volatile chemical leaves the engine room it is in the form of a fluid, but in making its long journey along the pipes which thread their way through the brine it evaporates into gas.

The evaporating process within absorbs so much heat from the surrounding mass of salt and water that the distilled water in the rectangular ice cans submerged in the brine is congealed into the finest ice. Each can contains 300 pounds of distilled water, which remains in its cold bath 48 hours. Then by means of a traveling hydraulic hoist, two cans at a time are raised from the tanks; the hoist, traveling forward, drops them for an instant in a well of hot water to loosen the contents, raises them to the floor, the cans are uncovered and overturned and out of each slips a steaming cake of ice as transparent as a pane of French plate-glass. After the cakes are slipped from their molds, they are shunted along a narrow shute, or track, leading into the great storehouse. Here they are packed in tiers and layers like neat piles of lumber with small strips of wood separating each cake from the other. The tanks of this great establishment always contain 588 tons of ice and freezing water, and 240 tons of ice are produced daily. Natural gas is often employed in the process of manufacturing artificial ice. As it escapes from the borings with a pressure of 20 or 30 atmospheres, the lowering of the temperature as it is released serves to freeze water even in summer. A still more simple and inexpensive process of preparing artificial ice is used in connection with the newly-perfected method of condensing the atmosphere into a liquid. The rapid evaporation of liquid air absorbs an immense amount of heat and everything brought into contact with it is frozen.

Iceberg, a mountainous mass of ice floating in the sea. Icebergs are produced by the breaking off of great masses from glaciers which have descended into the sea. When numbers of icebergs freeze together, they form what are called "fields" or "packs," which are often of great extent, stretching across the ocean as far as the eye can reach, and often rising in perpendicular cliffs from 80 to 100 feet above the water. Solitary icebergs are also of vast dimensions; and instances are given, both in Arctic and Antarctic voyages, of floating islands of ice several miles in circumference, rising from 40 to 200 feet above sea-level, and loaded with blocks and shingle. As they are floated by the polar currents to warmer latitudes, they melt away, dropping their burdens of bowlders and debris on the bottom of the ocean. Some geologists regard the water worn blocks, the gravel, and shingle of the "bowlder clay," as the deposits of ancient icebergs; but there are believed to have been mainly due to land glaciers.



AN ICEBERG.

Iceboat, a triangular framework of wood, running by means of a sail — with broad end forward — on three skates or runners 3 feet long by 8 inches deep. There is but one large sail, usually triangular, fastened to a boom and yard, which may be over 30 feet in length. Such an iceboat may be steered by the rudder-skate in almost any direction not in the teeth of the wind, and may attain an average speed of 30 or 40 miles an hour, and sometimes as much

as 65 miles. In a gale the speed attained has been greater than a mile a minute, and these machines often sail faster than the wind. The explanation of this paradox is really simple: If the wind is blowing from N. to S. at the rate of 40 miles an hour, the boat, going in a S. E. direction would occupy little more time in reaching a given point than the wind would in attaining the same. The wind would be pursuing the altitude, the boat the hypothenuse of a right-angled triangle and the hypothenuse might be double the altitude; in that case theoretically the iceboat would go twice as fast as the wind. The smoother the ice the less the friction and the greater the speed of the boat. Snow seriously reduces the speed. The Hudson and the Shrewsbury rivers may be regarded as the headquarters of this sport, and there are several iceboat clubs.

Ice-breaking Ship, a vessel designed to force its way through seas, bays, harbors, or rivers, when they are covered with ice. For six months of the year the Gulf of Finland, which is the waterway to St. Petersburg, in lat. 60° N., within 5° of the Arctic Circle, is frozen solid to a depth of 5 to 10 feet. Russia has not a port on the Baltic Sea or the Pacific Ocean into which ships can come from November to April. Many devices have been tried, but the "Ermak" (or "Yermak") is the only ship that has ever succeeded in forcing the barrier. The vessel was built from Admiral Makarof's plans at Newcastle, England, and is 8,000 tons burden, and her engines are of 6,000 horse power. She cleared from New Castle for Kronstadt, Russia, in March, 1899, and encountered the first solid ice at Reval, the Russian port at the entrance to the Gulf of Finland. In 200 miles from that point she plowed her way through ice from 5 to 10 feet thick at a speed varying from 2½ to 7 knots an hour. She reached Kronstadt, the island opposite St. Petersburg, on March 17. The secret of the power of this wonderful vessel is that she does not break the ice by main force. Under her bow is a screw which forces the water upward. This lifts the ice and cracks it. The powerful steel bow then casts it aside like drift ice and leaves a broad channel clear in which other vessels may safely navigate. In the United States this invention has been used in keeping the Great Lakes open to navigation. An ice-breaking ship employed on Mackinac Strait has a large screw at the bow, as well as at the stern, and breaks the ice by forcing the water up under pack ice and throwing it to both sides. When the bow screw is reversed it has a sucking motion and thus supplements the action of the stern propeller. During the summer months the bow screw is detached. This device may prove available in overcoming many of the difficulties in reaching the gold fields of Alaska, by opening a passage through the Bering Sea, at all seasons, to the mouth of the Yukon river, and it is probable that it may ultimately unlock the mysteries of the North and South poles.

Ice Crystals, hexagonal figures with angles of 60°, which water always assumes when it passes from the liquid to the solid state. The crystals of ice cannot ordinarily be seen, because in freezing they are so crowded together; but in thawing, the heat rays act first on the outsides of the crystals, dissolving them to water. The water occupies less space than the ice, so that minute vacuums are formed; when the structure is examined under the microscope a beautiful variety of six-rayed crystals, or ice-flowers may be seen, all having plane faces parallel to the surface of freezing. Snow is formed from moisture in air as ice is formed in water, and always on the six-sided plan. The architecture of crystals may be infinite in variety and yet unvarying in uniformity. The forms that are seen in snow in the spicules that span a small pond or pool just beginning to freeze, and in the patterns that may be observed on a window-pane, afford examples of the shapes ice crystals assume. Curious figures may also be produced within a block of ice during melting by passing a beam from the sun or from an electric light through it.

It was formerly supposed that ice was a brittle substance, and even as recently as 1850 the motion of glaciers was explained by the fine splitting of the ice caused by the weight and pressure of the immense masses resting on the lower layers. The experiments made by McConnell and Kidd in 1888 on the plasticity of ice seemed to establish the fact that single crystals were not plastic and that the plasticity of glacier ice as shown by Pfaff in 1875 was a mistake. The discovery made by Koch in 1885 that rods of ice laid on two sharp edges and loaded bent, but recovered their straightness when the weights were removed, seemed to be explained by the same principle. But further experiments made by McConnell and Mügge between 1890–1895 showed that this elasticity is noticeable in some cases but not in all. It depends on the direction in which the axis of the crystals forming the rod is turned. If the optical axis, that is to say, the chief axis of the hexagonal crystal, is parallel to the direction of the weight, in other words is vertical, then there is an increasing tendency to bend; but the rod is rigid when the optical axis is perpendicular to the direction of the weight, that is, horizontal. Ice that is artificially bent does not recover its rigidity. No cracks or irregularity were observed. The rods remained perfectly clear, but

when they were turned around and again loaded they became straight once more. This elasticity of the ice crystals is now regarded as the true explanation of the movement of glaciers, even though it has not yet been proved that the yielding quality of the ice does not increase with the temperature. Glaciers, especially in their upper portions, contain the single ice crystals out of which they are made, turned in various crystallographical directions. Therefore by pressure these crystals turn about so that in the majority of them the optical axis becomes parallel to the direction of pressure; and this change in them has been noticed by Hagenbach-Bischoff, Bertin, Graden and Dupré.

Ice Calorimeter, a method of determining specific heats by means of ice. Black's calorimeter consists of a block of ice with a cavity in its center, with a cover of ice. The body, whose specific heat is to be determined, is raised to a certain temperature, and then put in the cavity. When the body falls to 32° F., the freezing point, it is wiped clean, as is the cavity itself, with a cloth previously weighed. The increase of weight in the cloth measures the ice converted into water, whence may be deduced the specific heat of the body, the rule being that 79.25, or in round numbers 80 thermal units, are needed to liquefy a pound of ice.

Iceland, an island belonging to Denmark; between the North Atlantic and the Arctic Oceans, 250 miles from Greenland and about 600 miles W. of Norway; greatest length, E. to W., 300 miles; central breadth, about 200 miles; area with adjacent isles, 39,756 square miles. Pop. (1900) 75,663. In shape it somewhat resembles a heart with its narrowest point turned S. The coast line for a considerable extent on the S. E. is almost unbroken, but in all other directions presents a continued succession of deep bays or fiords and jutting promontories, thus affording a number of natural harbors. The interior has generally a very wild and desolate appearance, being covered by lofty mountain masses of volcanic origin, many of them crowned with perpetual snow and ice, which, stretching down their sides into the intervening valleys, form immense glaciers. These icy mountains, which take the common name of Jökul, have their culminating point in Oräfajökul, which is situated near the S. E. coast, and has a height of 6,409 feet. Among the volcanoes the most celebrated is Mount Hecla, in the S., about 5,000 feet high. Numerous hot springs or geysers are scattered throughout the island, but are found more specially in the S. W., to the N. E. of Reikjavik. There are numerous lakes and rivers. The most valuable mineral product is sulphur, of which the supply appears to be inexhaustible.

The climate is mild for the latitude, but the summer is too cool and damp for agriculture to be carried on with much success. In the S. parts the longest day is 20 hours, and the shortest 4, but in the most N. extremity the sun at midsummer continues above the horizon a whole week, and of course, during a corresponding period in winter never rises. Vegetation is confined within narrow limits. The most valuable crop is grass, on which considerable numbers of live stock (sheep, cattle, ponies) are fed. The reindeer, though not introduced before 1770, has multiplied greatly and forms large herds in the interior; but they are of little importance economically. Wild fowl, including the eider duck, whose down forms an important article of commerce, are abundant; the streams are well supplied with salmon, and on the coasts valuable fisheries of cod and herrings are carried on. Manufactures are entirely domestic, and consist chiefly of coarse woolens, mittens, stockings, etc. The exports are wool, oil, fish, horses, feathers, worsted stockings and mittens, sulphur, and Iceland moss.

The inhabitants are of Scandinavian origin, and speak a Scandinavian dialect, which still represents the old Norse or Norwegian in great purity. They are of the Protestant religion. Iceland has a constitution and administration of its own dating from 1874. There is an "Althing," or Parliament, which meets twice a year at Reikjavik, the capital, and consists of 36 members, of whom 30 are chosen by popular suffrage, and 6 nominated by the king. A minister for Iceland, nominated by the king, is at the head of the administration, but the highest local authority is vested in the governor.

Some settlements of Irish monks had been made in Iceland about the end of the 8th century, but the island received the greatest proportion of its population from Norway. In 870 Harald Haarfager had made himself supreme in Norway, and as he treated the landed proprietors oppressively, numbers left the country and went to Iceland. In the course of 60 years all the habitable parts of the coast were settled. A settled government was established, a sort of aristocratic republic, which lasted for several centuries. Christianity was introduced in 981, and adopted by law in 1000; and schools and two bishoprics, those of Holar and Skalholt, were established. The Latin language and the literature and learning of the West, introduced by Christianity, were all the more warmly received, because poetry and history had already been cultivated here more than elsewhere in the Germanic North. Previously to this time the Icelanders had discovered Greenland (983) and part of America (about 1000), and they were now led to make voyages and travels to Europe and the East. Politically and

ecclesiastically the most flourishing period of Iceland—the period too when its intercourse with the world abroad was most active—was from the middle of the 12th to the beginning of the 13th century. In 1264 Magnus VI. of Norway united Iceland with his own kingdom, with which it passed to Denmark in 1380, remaining with the latter in 1814, when Norway was joined to Sweden.

Iceland Moss, in botany, *Cetraria islandica,* formerly called *Lichen islandicus,* the thallus, which is olive-brown, paler on one side, is erect and tufted, laciniated, channeled, and dentato-ciliated; the fertile lacinia very broad, the shields, which are brown, flat, with their border elevated. It is found in small quantity on the ground in exposed places in Scotland. It is slightly bitter, as well as mucilaginous. An aqueous decoction of it, when cooled, makes a thick jelly. It is used as a tonic, demulcent, and nutrient.

Iceland Spar, a transparent calc-spar, or calcite, $CaCO_3$; it may be split along its cleavage-planes into an obtuse rhombohedron, and is doubly refracting.

Iceni (ī-cē′nī), a warlike tribe of ancient Britain, occupying the modern counties of Suffolk, Norfolk, Cambridge, and Huntingdon. They fought against the Romans under their queen Boadicea.

Ice Plant, in botany, *Mesembryanthemum crystallinum.* It is called ice plant from the many watery pustules covering its leaves and shining like ice. It is a diffusely procumbent herb, with ovate alternate leaves, clasping the stem and axillary, almost sessile, flowers. It grows on sandy seashores at the Cape of Good Hope, in the Canary Islands, and in Greece near Athens. There are two varieties, *M. crystallinum* and *M. glaciale;* the latter is that cultivated in gardens. The juice is said to be diuretic, and has been given in liver complaints. The burnt ashes are used by the Spaniards like barilla in glass works. Called from its luster also diamond plant.

Ichang (ī-chang′), a walled town in the Chinese province of Hu-pei; on the Yang-tsze-Kiang, where it escapes from the limestone gorges and ravines of its middle course; 1,000 miles from Shanghai. In 1877 it was declared open to foreign trade, but in consequence of the difficulties connected with the navigation of the river, the competition of the Chinese, and the jealousy of the Chinese officials it advanced but slowly.

Ich Dien (ih-dē′en), "I serve," the motto of Edward the Black Prince, whose badge was a single ostrich feather, afterward three ostrich feathers. The story that he adopted both motto and badge from John, the blind king of Bohemia, after the battle of Crécy, is not borne out by historical investigation. Since Edward's time the motto "Ich Dien" and the badge of three ostrich feathers have been employed as the cognizance of the Princes of Wales.

Ichneumon (ik-nū′mon), a Linnæan genus of insects, now constituting a family or tribe, *Ichneumonidæ,* of the order *Hymenoptera,* section *Terebrantia.* They are extremely numerous in species. Many of them are minute, others are large insects; the species of *Rhyssa* are among the largest of insects. They have the abdomen united to the thorax by a pedicle, which is often very slender. The abdomen itself is slender, and the whole form attenuated. All the *Ichneumonidæ* deposit their eggs either in or on—generally in—the bodies, eggs, or larvæ of insects, or in spiders. Some of them deposit their eggs in aphides. They are thus extremely useful to the farmer and gardener. Particular species of *Ichneumonidæ* are the natural enemies of particular kinds of other insects. Many caterpillars are infested by three or four species of ichneumons.

Ichneumon, a genus of digitigrade carnivorous quadrupeds of the family *Viverridæ,* having a much elongated body, small head, sharp muzzle, rounded ears, and short legs. The species, which are pretty numerous, are natives of Africa and the warmer parts of Asia. One, the Andalusian ichneumon (*Herpestes ichneumon*), occurs in the S. of Spain. They feed on small quadrupeds, reptiles, eggs, and insects. Some of them, particularly the Egyptian ichneumon and the mangouste, mongoose, or mungoose of India, have been greatly celebrated as destroyers of serpents and other noxious reptiles, many wonderful fables being superadded to the truth on this subject. The Egyptian ichneumon, the ichneumon of the ancients, is larger than a cat, gray, with black paws and muzzle. It was a sacred animal among the ancient Egyptians. The ichneumon is easily domesticated, and is useful in keeping houses free from rats and other vermin. It is therefore not infrequently domesticated in Egypt, as the mongoose also is in India. This species is rather smaller, of a lighter color, and has a pointed tail. Introduced into Jamaica, the mongoose did admirable service in clearing the sugar-cane fields of rats; but became a plague by destroying poultry and harmless animals.

Ichnology, the name applied to the modern science of fossil foot-prints, or other impressions on rocks. The impressions are almost always found on rocks that have been deposited as mud; they are not so common in sandstone, yet they abound in the New Red Sandstone strata.

Ichor (ik′or), the ethereal fluid that supplied the place of blood in the veins of the gods of Greek mythology. The name is

applied in medicine to the thin watery discharge from a wound.

Ichthelidæ (ik-thel′ä-dē), the sun-fishes of Jordan, a family of *Acanthopteri*. They are percoid fishes with a single dorsal fin, either continuous or deeply divided, with 8 to 12 spines; anal fin large with 3 to 9 spines; body oblong, more or less elevated, sometimes much compressed. Colors usually brilliant, chiefly olive-green, with spots or shades of blue, yellow, orange, or violet. Fresh-water carnivorous fishes, many of which build nests which they defend with great courage. Genera about 15, species 40, all of the United States; most abundant in the Mississippi valley. Sub-families, *Micropterinæ*, *Centrarchinæ*, and *Ichthelinæ*.

Ichthyol, a medicine prescribed for its effect upon the alimentary canal and the general system. It can be adminstered in liquid or solid form and it is also employed as an inhalant. Its basis is a bituminous mineral rich in fish fossils.

Ichthyology (ik-thē-ol′ō-jē), the science which treats of fishes. Aristotle (B. C. 384–322) described fishes as well as other animals in his "Natural History." Belon in 1553, Rondelet in 1554 and 1555, Salviani (1554–1558), Willoughby (1635–1672), John Ray (1628–1705), all made important contributions to ichthyology. Artedi (1705–1735) was the precursor of Linnæus (1707–1778). Cuvier's "Natural History of Fishes" was issued between 1828 and 1849; Agassiz's various papers and publications on ichthyology between 1829 and 1844. See FISH.

Ichthyopsida (ik-thē-op′sē-dä), one of the three great primary divisions of the *Vertebrata* (the others being *Sauropsida* and *Mammalia*), comprising the fishes and amphibia.

Ichthyornis (ik-thē-or′nis), a fossil genus of carnivorous and probably aquatic birds, one of the earliest known American forms. It is so named from the character of the vertebræ, which, even in the cervical region, have their articular faces biconcave as in fishes. It is also characterized by having teeth set in distinct sockets.

Ichthyosaurus (ik-thē-ō-sou′ros), an extinct fish-lizard; the typical genus of the order *Ichthyosauria*. It consists of gigantic fossil marine reptiles, with paws which show them to have been carnivorous; and the half-digested remains of fishes and reptiles even of their own species, found within their skeleton is a proof of the nature of their food. Their vertebræ were fishlike, their paddles like those of a porpoise or a whale, and their long powerful tail a propeller which enabled them to dart with great rapidity through the water. The genus extended from the Trias of Germany to the White Chalk of England. One of the earliest and best known species was *Ichthyosaurus communis* of Conybeare. It is from the Lias. *I. platyodon*, also from the Lias at Lyme Regis, must have been more than 24 feet long.

HEAD OF ICHTHYOSAURUS.

Ichthyosis (ik-thē-ō′sis), a name for fish-skin disease, characterized by the development on the skin of thick, hard, dry, imbricated scales of a dirty gray color. There is no pain, heat, or itching. It is said to be a congenital disease and lasts through life. Oiling the skin (dugong oil being perhaps best), to keep it supple, is the only remedy of importance, with attention to the general health.

Ichthys (ik′thus), a word found on many articles, as rings, seals, tombstones, etc., belonging to the early years of Christianity. It is supposed to have had a mystical meaning, from the fact that the several characters are the initial letters of the Greek words *Iēsous Christos, Theou Huios, Sōtēr* = Jesus Christ, the Son of God, the Saviour.

Icica (ī′sē-kä), a genus of *Amyrids*, family *Burseridæ*. It consists chiefly of tall trees with balsamic or resinous juice, unequally pinnate or ternate leaves, and racemes or heads of small whitish or greenish flowers. About 20 species are known, found mostly in the warmer parts of America. *Icica guianensis* furnishes incense-wood, *I. icicariba*, part of the American elemi; *I. carana*, the American balm of Gilead; *I. aracouchini*, the balsam of acouchi; *I. ambrosiaca*, the resin of coumia; and *I. altissima*, the curana, samaria, acuyari, mara, or cedarwood of Guiana.

Icilius (ē-sil′yus), a Roman tribune to whom Virginia was betrothed. When the latter was carried off by the decemvir Appius Claudius, he raised an army against the decemvirs, and having caused their fall, was created by the people tribune for the second time, B. C. 449.

Iconium (ē-kō′nē-um), an ancient town of Asia Minor, on the W. edge of the plateau that skirts the N. slopes of the Taurus Mountains, 310 miles E. of Smyrna. The capital under the Romans of Lycaonia, it was three times visited by St. Paul, who founded there a Christian Church. In 708 it fell into the hands of the Arab conquerors. Its prosperity culminated in the end of the 11th century, when it was made the capital

of the Seljuk empire. In 1190 Frederick Barbarossa defeated the Turks in the neighborhood, and captured Iconium. In 1832 Ibrahim Pasha defeated the Turks there. The modern town, called KONIA, the capital of the Turkish vilayet of the same name, is a place of some 30,000 inhabitants, who live by commerce, by making stockings and gloves, and on the contributions of the numerous pilgrims who visit the sacred tombs and other holy places of the town. Here is the principal monastery of the Mevlevi or "dancing" dervishes in the Ottoman empire.

Iconoclasts (image-breakers), that Christian party which would not tolerate images in the churches, much less the adoration of them. This dispute began in Greece, and extended from thence over Europe; it was most violent in the 8th and 9th centuries. In the first three centuries after Christ the Christians had no paintings or images in the churches. The first cause of the Christian worship of images was partly the custom of erecting columns in honor of the emperors with their statues, partly the attempt to preserve the memory of the bishops and the martyrs by images. In the 4th, and still more in the 5th century, they were placed in the churches, yet without receiving any adoration; but in the 6th century people began to kiss the images in token of respect, to burn lights before them, to offer incense in honor of them, and to ascribe to them miraculous power. Some bishops endeavored to dissuade Christians from this worship of images. The images themselves were tolerated by some as becoming decorations of the church, while others in their reverence for them approximated to complete idolatry. The Eastern Emperor Leo III., the enemy of superstition and the worship of the images, issued an edict in 726 ordering the people to abstain entirely from the worship of statues, as well as paintings and mosaics, and this edict was soon after followed by another ordering the destruction of the images. This order occasioned commotions, first in the islands of the Archipelago; and as the Popes Gregory II. and III., as well as Germanus, the Patriarch of Constantinople, admitted of the worship of images, and the Emperor Leo refused to recall his edict on their command they excommunicated him, and his subjects in Italy threw off their allegiance. Then arose two parties in the Christian Church, namely, the Iconolatræ (image worshipers) and the Iconoclasts, who each in turn persecuted the other even to death. Leo's son and successor, Constantine Copronymus, held the same views as his father. He convened a council at Constantinople (754), in which the use as well as the worship of images was condemned. Constantine's son, Leo IV., who ascended the throne 775, followed the same course but proceeded with more clemency and moderation. On the death of Leo IV., in 780, he was succeeded by his son Constantine, under the guardianship of Irene, mother of the latter and widow of Leo. Irene favored the image worshipers, and on attaining this position of authority openly avowed her sentiments and summoned a council to be held in 787, under her protection at Nicæa (Nice) in Bithynia, the majority of the members of which were image worshipers. This council restored the worship of images and inflicted punishment on those who maintained that nothing but God ought to be worshiped. Though the Greeks and Italians were addicted to the worship of images, yet most Christians of the West, as the Britains, Germans, Gauls, did not follow their example; on the contrary, they asserted that it was lawful to retain images and expose them in the churches, but that they could not be worshiped without offending God. Charlemagne, probably assisted by Alcuin, wrote against the worship of images, and a council which he caused to be held at Frankfort-on-the-Main (794) confirmed his opinion, notwithstanding the opposition of Pope Adrian. Among the Greeks the controversy concerning images broke out anew after the banishment of Irene (802) and lasted about half a century. Her successor, Nicephorus, did not indeed remove the images from the churches, but he forbade the adherents of the images from persecuting their adversaries. Finally the Empress Theodora, by a council held at Constantinople (842), restored the worship of images among the Greeks, which was confirmed by a second council, held 869–870, in the same place. In the Western empire images were at first retained only to preserve the memory of pious men but the worship of them was forbidden. This use of them was confirmed by a council summoned by Louis the Debonnaire in 825; but this opinion was gradually abandoned, and the decision of the Pope, which allowed the worship of images, finally prevailed in the Western Church.

Iconography, in an extended sense, the description of any figures found in paintings and sculpture, as well as monumental records of ancient date; but in its restricted signification this word is confined to descriptions and drawings of any sculptured images or paintings of the human form, animals, and inanimate objects, that are found in buildings and appurtenances, and furniture devoted to ecclesiastical purposes. This is more properly termed Christian iconography, and embraces all objects connected with Christian art from the earliest times, as far as the close of the 15th century. When the word is understood in this sense, it is a branch of ecclesiology.

Icteria (ik-ter′ē-ä), a genus of birds placed by Swainson under his sub-family *Brachypodiæ* (short-footed thrushes), and by Jordan doubtfully under the *Sylvicolidæ* (warblers). The bill is shorter than the head, and has a broad base; the culmen elevated and arched; both mandibles entire; the wings and tails rounded; the middle toe very long. *I. virens*, or *viridis* (*I. polyglotta* of Wilson) the yellow-breasted chat, is found in the United States, and is described by Jordan as a quaint, loud songster. It has great powers of imitating the sounds which it hears.

Icteridæ (ik-ter′ē-dē), a name for orioles; a family of *Passeres*, insessorial birds. The bill has the commissure angulated, as in the *Fringillidæ*, but usually lengthened, with no notch; the primaries nine; the legs stout; the plumage usually brilliant; the notes sharp, often melodious, in other cases harsh. Sub-families three, *Agelainæ*, *Icterinæ*, and *Quiscalinæ*. About 20 genera and 100 species are known, all American.

Ictinus (ik-tī′nus), a Greek architect; born about 490 B. C. In addition to his masterpiece, the Parthenon, the temple of Apollo Epicurius at Bassæ, near Phigalia, the sculptured reliefs from which are now in the British Museum, may be ascribed to him. He is also known to have been the architect of a temple at Eleusis, and to have written an exhaustive treatise upon the Parthenon, with which his name is indissolubly connected. He died about 420 B. C.

Ice Cape, a headland of Alaska, projecting into the Arctic Ocean in lat. 71° N., and about lon. 160° W., about the middle of that long reach of the Arctic coast between Cape Lisburne on the S. W., and Cape North or Point Barrow on the N. E. It was discovered by Cook, in 1778, and was his furthest point N. of Bering's Strait. The name was given it because of the immense masses of ice by which it is usually surrounded.

Ida, a high mountain range in Asia Minor, extending from Phrygia through Mysia into Troas. The city of Troy was situated at its base. It is the scene of many ancient legends. The S. part of the range was called Gargarus, the highest peak of which is about 4,700 feet above sea. Here there was a temple of Cybele, who therefore was called the "Idæan Mother." From Ida flow several famous streams, as the Granicus, Simois, and Scamander. There is another Ida in Crete, extending from W. to E., and now called Psiloriti. On this Ida, according to an ancient legend, Zeus was educated.

Idaho, a State in the Western division of the North American Union; bounded by Montana, Wyoming, Nevada, Oregon, Washington and British Columbia; admitted to the Union July 3, 1890; number of counties, 21; capital, Boisé; area 84,800 square miles; pop. (1900) 161,772; (1910) 325,594.

Topography.— The surface of the State is exceedingly mountainous. The Rocky Mountains form the N. E. boundary separating Montana from Idaho, and send out spurs in a W. direction extending to the Sierra Nevadas. The principal ranges are the Salmon, Bitter Root, Bear River, and Saw Tooth. The Salmon range extends along the Salmon river and reaches an altitude of 12,000 feet; the summits being rugged and several being covered with snow. The Goose Creek and Bear River mountains extend along the S. portion of the State. Three-fourths of the State — the S. portion — is arid, agriculture being practised only by means of irrigation. The soil is very fertile and the water supply abundant. The principal irrigated sections of the State are in the Bear, Snake, Boisé, Payette and Weiser river valleys. These valleys lie at an altitude of from 700 to 5,000 feet. The Snake river, a tributary of the Columbia, and the Wood, Bruneau, Boisé, Payette, Weiser and Salmon rivers, its principal branches, form the drainage system of the S. portion of the State; the principal rivers of the N. part are the Spokane, St. Joe, St. Mary's, Clearwater, Cœur d'Alêne, Priest, and North Fork of the Columbia. The entire State drains into the Columbia with the exception of a small portion in the S. E., which is drained by Bear river into the Salt Lake basin. A large area in the S. portion is drained by streams which sink a short distance from the mountains (the lost river drainage system) and find an outlet to the Snake river by subterranean channels. There are numerous lakes, including the Pend d'Oreille, Cœur d'Alêne, Bear, Henry, and Payette Lakes. There are many beautiful waterfalls in the State, the Snake river having four important ones, namely, Shoshone, a 210-foot fall, Twin, Salmon, and American Falls. The mean elevation of the State is about 4,700 feet.

Geology.— Most of the State is covered with Azoic, Eozoic, and Tertiary formations. Numerous fossils have been found, including the remains of the mastodon, elephant, tapir, monkey, alligator, and saurian families. Large portions of the State are of recent volcanic formation, and the whole region is noted for its geysers, steam and soda springs and natural hot baths.

Soil.— The soil is largely of volcanic origin, and is very fertile when water is applied. The mountains are for the most part covered with forests, which are largely evergreen. The S. counties are covered with sage plains which, under irrigation, are

Idaho

well adapted to agriculture. The N. portion of the State and the upper portions of the Boisé, Weiser, and Payette valleys are covered with dense forests, the principal timber being white and yellow pine, fir, cedar, spruce, hemlock, and tamarack.

Mineralogy.— Gold, silver, and lead occur in abundance throughout all the mountains in the State. Large bodies of gold-bearing gravel are found along the Snake, Salmon, and Boisé rivers, the Boisé basin being noted for its auriferous gold deposits. About one-third of the lead mined in the United States comes from the Cœur d'Alêne district. In 1899 the principal mineral products were lead, 54,154 short tons; copper, 110,000 pounds; silver, 3,851,800 fine ounces, valued at $4,980,105; and gold, 91,380 fine ounces, valued at $1,889,000.

Agriculture.—The N. part of the State is noted for its wheat. Owing to the sheltered location of many of the irrigated valleys agricultural products cover a wide range. All cereals and the ordinary garden vegetables and small fruits are grown. Peaches, pears, apples, apricots, and prunes are the principal products of horticulture. The mountains of the S. portion afford excellent pasturage and, with irrigation, the plains of the Snake river and its tributary valleys are rapidly being converted into cereal fields. The principal farm products of Idaho in 1900 were hay, 659,103 tons, valued at $4,284,170; wheat, 3,104,629 bushels, valued at $1,428,129; oats, 1,349,845 bushels, valued at $539,938; potatoes, 684,080 bushels, valued at $321,518; and barley, 299,012 bushels, valued at $199,506. The domestic animals on farms and ranches in the State Jan. 1, 1900, were, horses, 127,821, valued at $2,863,540; mules, 899, valued at $32,810; milch cows, 33,075, valued at $1,055,092; other cattle, 364,853, valued at $8,672,748; and sheep, 2,658,662, valued at $7,444,254.

Manufactures.—In 1900 there were reported by the United States census 591 manufacturing establishments, employing $2,941,524 capital and 1,477 persons; paying $862,088 in wages, and $2,055,368 for raw materials; and having an annual output valued at $4,020,532. The principal articles of manufacture include flour and grist, railroad cars, lumber and timber products, printed matter, harness and saddlery, dairy products, furniture, foundry and machine-shop products, clothing, liquors, tobacco, and cigars.

Banking.— In 1901 there were 13 National banks in operation, having $650,000 in capital, $223,354 in outstanding circulation, and $231,650 in United States bonds. There were also 10 State banks, 3 private banks, and a trust and loan company.

Education.— In 1900 the school population was 54,839; the enrollment in public schools, 38,996, and the average daily attendance 29,371. There are 748 public school buildings; 1,067 teachers; public school property valued at $855,975; receipts for the year, including balance on hand, $552,026; and expenditures, $499,836. For higher education there were 10 high schools (public), 10 private secondary schools, 2 public normal schools, and the University of Idaho.

Churches.— The strongest denominations in the State are the Mormon, Roman Catholic, Methodist Episcopal, Presbyterian, Congregational, Lutheran, and Protestant Episcopal. In 1900 there were 175 evangelical Sunday-schools with 1,000 officers and teachers and 10,500 scholars.

Railroads.—The total length of railroads in the State on Jan. 1, 1901, was 1,387.60 miles, of which 50 miles were constructed during the previous year. In 1901 the total valuation of the railroads in the State was $9,071,787, an increase over 1900 of $1,352,025.

Postoffices and Periodicals.— In 1901 there 448 postoffices of all grades, and 72 periodicals of which 4 were daily, 5 semi-weekly, 59 weekly, 2 semi-monthly, and 2 monthly.

Finances.— The equalized valuation of all taxable property in 1900 amounted to $47,451,113.85; and the equalized valuation in 1901 is $51,440,758.19. The total bonded debt on Jan. 1, 1901, was $443,500; and the General Fund warrants outstanding, $92,016.46. The State holds $73,000 of the above bonds.

State Government.— The governor is elected for a term of two years and receives a salary of $3,000 per annum. Legislative sessions are held biennially, and are limited in length to 60 days each. The Legislature has 21 members in the Senate and 46 in the House, each of whom receives $300 per session. There is one representative in Congress. The State government in 1904 was Republican.

History.— Idaho was for years successively a part of Oregon, Utah, Washington, and Nebraska, and was explored early in the 19th century by Lewis and Clarke. A mission was established at Cœur d'Alêne in 1842, but till the discovery of gold in 1852 the State was visited only by hunters. Idaho was organized as a Territory, March 3, 1863, but in 1864 part of it was set apart as Montana and in 1868, another part, forming part of Wyoming. In the summer of 1889 a convention framed a constitution and a petition for admission to the Union, being admitted the following year, the 30th State in order of admission.

FRANK W. HUNT.

IDAHO

SCALE OF MILES
10 5 0 10 20 30 40 50 60

Indian Reservation Boundaries
Forest Reserve "
State Capital ⊛ County Seats ⊙

CANADA

MONTANA

WASHINGTON

OREGON

WYOMING

NEVADA

UTAH

Kingsgate
Eastport
Porthill
Copeland
Snyders
Meadow Cr.
Summit
Moyie Springs
Kaniksu
Crossport
Leonia Sta. or Lenia P.O.
Naples
McArthur
Elmira
Iola
Williams
Colburn
Troy
Libby
Jennings
North Spur
Rover
Open Fork Rivers
Calliope
Welty
Sagle
Lake
Thornton
Clarkfork
Cabinet
Heron
Noxon
Trout Creek
Thompson
Eddy
Plains
Deborgia
St. Regis
Eagle Peak 5500
Iron Mountain
Arlee
Rivulet
Desmet
Missoula
Big Blackfoot
Bonner
Lolo
Lolo P.
Carlton
Stevensville
Victor
Woodside
Hamilton
Philipsburg
Rumsey
Anaconda
Silverbow
Butte
Deerlodge
Garrison
Drummond
Marysville
HELENA
Wickes
Boulder
Townsend
Lombard
Gallatin
Logan
Whitehall
Waterloo
Sappington Sta.
Bozeman
Livingston
Nelhart
White Sulphur Sps.
Ft. Benton
Steele Sta.
Great Falls
Chouteau
Kipp
Cut Bank
Midvale
Tolton
Kalispel
Essex
Atlanta
Rexford
Tobacco
Flathead Lake
Bitter Root
Bald Mt.
Pot Mt.
Clearwater Forest Reserve
Coeur d'Alene
Harrison
Coeur d'Alene Ind. Res.
Moscow
Kendrick
Genesee
Lewiston
Orofino
Grangeville
Elk City
Orogrande
Whitebird
Seven Devils
Mt. Idaho
Newsome
Denver
Tolo
Canfield
Eureka
Pomeroy
Asotin
Spokane
Cheney
Palouse
Garfield
Colfax
Pullman
Farmington
Marshall
Belleview
Springston
Plummer
Chatcolet
St. Joe
St. Maries
Remington
Desmet
Emida
Sanders
Tyson
Santa
Fernwood
Clarkia
Harvard
Princeton
Stanford
Cornell
Trumbull
Howell
Nora
Anderson
Deary
Ivy
Park
Taney
Cameron
Lindsay
Crescent
Dent
Southwick
Cavendish
Thakean
Juliaetta
Leland
Lenore
Peck
Pierce
Greer
Fraser
Pardee
Woodland
Harrisburg
Clover
Kamiah
Kooskia
Syringa
Lochsa
Lowe
Stites
Greencreek
Ferdinand
Cottonwood
Keuterville
Lapwai
Spalding
Lewiston
Clearwater Jc.
Orchard Prairie
Clarkston
Asotin
Pomeroy
Snake R.
Lit. Spokane R.
Spokane
Moab
Hauser
Midway
Rathdrum
Spirit Lake
Noyes
Athol
Ramsey
Granite
Mt. Carlton
White
Chance
Clagstone
Valley
Cocolalla
Priest River
Newport
Priest Lake
Priest River Forest Reserve
Deep Creek
Meadow Creek
Bonners Ferry
Moravia
Coeur d'Alene R.
Coeur d'Alene Lake
Spokane R.
Kootenai R.
Clark Fork R.
Flathead R.
North Fork Flathead R.
Middle Fork Flathead R.
South Fork of Flathead R.
Swan R.
Missoula R.
Bitter Root R.
Big Hole R.
Jocko R.
Flathead R.
Sun R.
North Fork Sun R.
Smith R.
Missouri R.
Medicine R.
Hell Gate R.
Stony Fork
Hell Gate S.
Nez Perces Pass
Big Hole Pass
Russ Pass
Lolo Pass
Pot Mt. Pass
Bitter Root Mts.
Coeur d'Alene Mts.
Clearwater Mts.
Seven Devils Mts.
Salmon R. Mts.
Belt Mts.
Little Belt Mts.
Big Belt Mts.
Highwood Mts.
Sweetgrass Hills
Wisdom
Jefferson R.
Madison R.
Gallatin R.
Yellowstone R.
Boulder R.
Smith R.
Judith R.
Musselshell R.
Milk R.
Marias R.
Two Medicine R.
Cut Bank R.
Kipp
Midvale
Tolton
Kalispel
Essex
Atlanta
Rexford
Tobacco
Flathead Lake
Bitter Root
Bald Mt.
Pot Mt.
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Spokane
Cheney
Palouse
Garfield
Colfax
Pullman
Farmington
Marshall
Belleview
Springston
Plummer
Chatcolet
St. Joe
St. Maries
Remington
Desmet
Emida
Sanders
Tyson
Santa
Fernwood
Clarkia
Harvard
Princeton
Stanford
Cornell
Trumbull
Howell
Nora
Anderson
Deary
Ivy
Park
Taney
Cameron
Lindsay
Crescent
Dent
Southwick
Cavendish
Thakean
Juliaetta
Leland
Lenore
Peck
Pierce
Greer
Fraser
Pardee
Woodland
Harrisburg
Clover
Kamiah
Kooskia
Syringa
Lochsa
Lowe
Stites
Greencreek
Ferdinand
Cottonwood
Keuterville
Lapwai
Spalding
Lewiston
Clearwater Jc.
Orchard Prairie
Clarkston
Asotin
Pomeroy
Snake R.
Lit. Spokane R.
Spokane
Moab
Hauser
Midway
Rathdrum
Spirit Lake
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Yellowstone R.
Boulder R.
Smith R.
Judith R.
Musselshell R.
Milk R.
Marias R.
Two Medicine R.
Cut Bank R.

Hammond's 8 x 11 Map of Idaho.
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A 117 B 116 C 115 D Longitude 114 West E from 113 Greenwich F 112 G 111 H

45 44 43 42 — 5 6 7

Idaho, University of, a coeducational non-sectarian institution in Moscow, Ida.; founded in 1892; has grounds and buildings valued at over $450,000; endowment, about $375,000; volumes in the library, 22,000; scientific apparatus, etc., over $100,000; ordinary income, about $200,000; average number of faculty, 50; average students, 600; graduates, over 250.

Idalium (id-al'yum), now DALI, a promontory of the E. coast of Cyprus on which was a celebrated temple of Venus.

Idas (ī'das), in Greek mythology, a hero who fought with Apollo for the maid Marpessa, and won her.

Iddesleigh, Stafford Henry Northcote, 1st Earl of (id'dels-lā), an English statesman; born in 1818. He was educated at Balliol College, Oxford, where he gained the highest honors; became private secretary to Gladstone in 1843, and was called to the bar in 1847. In 1851 he succeeded his grandfather in the family baronetcy. He held various offices, and represented several constituencies in Parliament, being long member for North Devon. He published a treatise, "Twenty Years of Financial Policy," in 1862. He was made special commissioner to the United States to arrange the "Alabama" difficulty. Subsequently he was secretary for India (1867–1868) and chancellor of the exchequer (1874–1880). Upon Mr. Disraeli's elevation to the peerage he became leader of the Lower House, his task being all the more difficult on account of the parliamentary obstruction of the Irish Home Rule party. He was elected lord rector of Edinburgh University in 1883; was created Earl of Iddesleigh in 1885; and became first lord of the treasury. He died in 1886.

Ide, Henry Clay, an American jurist; born in Barnet, Vt., Sept. 18, 1844. He was graduated at Dartmouth in 1866; served in the Vermont Legislature; was made United States Commissioner to Samoa in 1891, and was chief-justice of the island in 1893-1897; member of Philippine Commission in 1900; vice-governor there in 1904-1905; governor-general in 1906; Minister to Spain in 1909.

Ide, a fish of the carp family, the *Leuciscus idus,* found in Northern Europe.

Idea, a mental image, form, or representation of anything. The word idea has been taken in very many and very different senses, the history of which would be a history of philosophy. The idea of Plato (429–347 B. C.) is the pure archetypal essence in which things subsumed under the same concept participate; Aristotle (384–322 B. C.) taught that though the One, apart from and beside the many, does not exist, none the less must a unity be assumed as (objectively) present in the many; and the Stoics (Zeno, 355–263 B. C.) maintained the doctrines of subjective concepts formed through abstraction. Philo, who flourished about the middle of the 1st century, transformed the Platonic ideas into divine thoughts, having their seat in the Logos, and says, "This is the doctrine of Moses, not mine." According to Plutarch of Chæronea (toward the end of the 1st century), the ideas were intermediate between God and the world; they were the pattern and God the efficient cause. For Plotinus (203–270) the primordial essence was elevated above the Platonic ideas, which were emanations from the One. St. Thomas of Aquin (1227–1274) recognizes a form in which the universal exists before things — viz., as ideas in the divine mind. For Descartes (1596–1650), "ideas are the forms of things received into the soul"; for Spinoza (1632–1677) the "concepts formed by the mind as a thinking thing"; and Locke (1632–1704) says, "whatsoever the mind perceives in itself, or is the immediate object of perception, thought, or understanding, that I call an idea." In the philosophy of Leibnitz (1646–1716) ideas are the active forces of his monads; Berkeley (1684–1753) used the word as equivalent to phenomenon; Hume (1711–1776) defines ideas as "copies of perceptions," and Condillac (1715–1780) as "mental representations of objects of apprehension." Kant (1724–1804) gives the name of ideas to those "necessary conceptions of the reason for which no corresponding real objects can be given in the sphere of the senses." According to Erasmus Darwin (1731–1802), an idea is a "contraction, or motion, or configuration of the fibers which constitute the immediate organs of sense." Romagnosi (1761–1835) rejects the notion that ideas are only transformed sensations; he recognizes in the mind a specific logical sense, to which he attributes the formation of universal ideas and ideal synthesis. James Mill (1773–1836) calls ideas "what remain after sensation has gone," and Herbart (1776–1841) "typical conceptions." Schopenhauer (1788–1860) posits as intermediate between the universal will and the individual in which it appears, various ideas as real species forming stages in the objectification of the will.

Idealism, the name given to certain philosophical systems which deny the individual existence of object apart from subject; or of both apart from God or the Absolute. Idealism denies the existence of bodies, holding that their appearances are merely ideas (perceptions) of the cogitant subject. Subjective idealism teaches that

these ideas are produced by the mind; objective idealism that God is their author. To these two hypotheses all idealism may be reduced. Zeno of Elea, in classic times, anticipated modern idealism. The teaching of Zeno underwent many changes, till it appeared in the modified idealism of Plato, which was itself, in course of time, repeatedly added to or diminished. Berkeley developing Locke, Descartes, Spinoza, and Leibnitz did much to revive idealism. Kant has been claimed as an idealist — Franck makes Kant's *idéalisme subjectif* one of the three divisions to which he refers all modifications of Ideal philosophy; but Lewes says Kant "never overlooks the distinction between the phenomena which the mind fashions, and the noumena which it only postulates." Fichte, Schelling, and Hegel are the founders of the great schools of German Idealism, called respectively, Subjective, Objective, and Absolute. For Fichte the object has no real existence, but is dependent on the subject; the non-Ego is the product of the Ego (the human soul). For Schelling object and subject are equally real, and equally manifestations of the Ego (in his system the Absolute, the Substance of Spinoza). Hegel's only reality in this case is the relation between the Ego and the non-Ego.

Ideal Realism, a name for the teachings of an eclectic branch of the Kantian school, who attempted to build up a harmonious system without sacrificing Kant's realistic postulates to his idealistic teachings, or conversely giving up the latter in favor of the former. Schleiermacher, Ulrici, and Trendelenburg were of this section of Kantists.

Ideas, Association of. See Association of Ideas.

Identity, the quality or state of being identical or the same; sameness; identicalness.

Personal.—The sameness of each individual throughout life, though the atoms of which the body are composed, the disposition, habits, and modes of thought, are continually changing. Every act of memory is positive testimony in favor of personal identity; to remember is to refer a past state of consciousness to the same subject who here and now recalls it.

Principle.—The principle that every ens is necessary itself and not any other ens. This follows directly from the first principle of Scholastic Philosophy, sometimes called the Principle of Contradiction. The same thing cannot be and not-be at the same time. (*Nequit idem simul esse et non esse.*)

Philosophy.—The name given to the objective idealism of Schelling, who transformed Fichte's doctrine of the Ego, combining it with Spinozism. According to this system, object and subject, real and ideal, nature and spirit are indentical (not in themselves, but) "in the Absolute," of which they are manifestations. Schelling's Idealism is sometimes known as Identism.

Ideology, a term introduced by Destutt de Tracy in his "Elements of Idealogy" (1801–1804) to designate the philosophy of the French Sensational School. The mind, according to de Tracy, is nothing but sensation, or more properly the sensibility of which sensation is the exercise. This sensibility is susceptible of impressions arising (1) from the present action of objects upon its organs, when it feels simply; (2) from past actions, when it repeats or recollects; (3) from things which have relations, and so may be compared, when it judges; and (4) from the wants of the individual, when it wills. Thus sensation, according to the nature of its objects, manifests itself as pure perception, memory, judgment, or will. The word has now come to have a more extended meaning, and its use is not confined to a particular school.

Ideomotor Action, action excited or caused by a dominant idea.

"The cerebrum responds automatically to impressions fitted to excite it to reflex action, when from any cause the will is in abeyance. . . . Thus in the states of reverie, dreaming, somnambulism, etc., whether spontaneous or artificially induced, ideas which take full possession of the mind, and from which it cannot free itself, may excite respondent ideo-motor actions; as happens also when the force of the idea is morbidly exaggerated, and the will is not suspended, but merely weakened, as in many forms of insanity."—Carpenter, "Mental Physiology."

Ides, in the ancient Roman calendar, the 15th day of the months March, May, July, and October, and the 13th day of the other months.

Idiocrase. See Vesuvianite.

Idiocy, a condition defined by Ireland as "mental deficiency or extreme stupidity depending upon malnutrition or disease of the brain occurring either before birth or before the evolution of the mental faculties in childhood; while imbecility is generally used to denote a less decided degree of such mental incapacity." The difference between both conditions and dementia is that the dement was once sane and responsible, the idiot and the imbecile never developed mental capacity at all; they remained arrested children. The name amentia has been given to idiocy. The mental faculties never showed themselves in any high degree, because the organ of mind in the brain never developed. There are great varieties of idiocy and imbecility. Some of the lowest have no speech, no power of distinguishing between one person and another, no affection or hatred, no feelings of pleasure or pain, no power to take care of themselves,

and can never be taught any of these things. In body such idiots are dwarfish, misshapen, ugly, with the features and expression of face often of the lowest of the lower animals, with no power of walking. This being the condition of the lowest varieties, they rise gradually in the scale till many imbeciles are beautiful in features, and reach normal bodily development, but are slightly wanting in some essential mental faculty, in intelligence, or in affection, or control, or self-guidance. The mental deficiency is in by far the majority of idiots and imbeciles accompanied by corresponding bodily weaknesses of some sort.

Idiots and imbeciles differ much in their capacity for further development under even favorable circumstances. Some can be greatly elevated toward the standard of average humanity, and can even be rendered fit to earn their own livelihood in simple trades or manual labor, while others cannot be in any way improved. They are especially subject to certain bodily diseases of degeneration, such as scrofula, consumption, rickets, and diseases of deficient nutrition generally. Two-thirds of idiots die of consumption. The great aims in treatment are to improve the bodily nutrition, the nervous and muscular action, and the habits, to teach coördinated movements and simple employments, such as gardening, mat-making, carpentering, etc., and to evolve the possible intelligence by an education through the senses. Some of them have one faculty or capacity fairly or even extraordinarily developed, while the general mental power is weak. Some are good musicians. Some can calculate well, while others are ingenious in constructiveness. Such faculties have in those cases to be especially cultivated. For this purpose good food, exercise, drill, warmth, fresh air, and music are necessary, and a careful study and testing of each case to find out its strong and weak points; and teachers who devote themselves to this particular kind of educative process are required. For most of them this can only be done in training schools. It is felt by many persons that in addition to these a kind of school is needed between them and the ordinary school, for the purpose of developing "backward children," of whom there are a considerable proportion in schools — a deadweight on teachers and on the progress of the ordinary scholars. Education should be suited to the educability and the inherent brain capacity of the scholar. Congenital idiots and imbeciles may have attacks of acute insanity, for which they may need to be sent to asylums for the insane; but as a general rule such institutions are not suitable for them.

From a scientific point of view, both psychologically and physiologically, the undeveloped minds and bodies of this class have great interest and high importance.

Ireland classifies idiocy into 10 divisions: (1) Genetous, (2) Microcephalic, (3) Eclampsic, (4) Epileptic, (5) Hydrocephalic, (6) Paralytic, (7) Cretinic, (8) Traumatic, (9) Inflammatory, and (10) by deprivation of the senses. From this it is seen that there are many pathological causes of the disease. It is a popular error to suppose that all idiots have small heads. Three-fifths of them have larger heads than average men, and only a few (the microcephalic) are small headed. It is quality more than quantity of brain that counts for mind. The general causes of idiocy have not yet been fully made out. It is unquestionably hereditary in at least 50 per cent. Consanguine marriages are the cause of idiocy beyond doubt, but only when the stock is bad, and so any tendency to nervous disease in the parents is doubled in the children. Scrofula is another fertile source of this degeneration of humanity, and there is ground to believe that frights to the mother when pregnant cause a small proportion of the idiocy of the world. But idiots are born in apparently perfect healthy families. Evolutionally idiocy, imbecility, and cretinism may be looked on as reversions to a lower type, and so an example of one of nature's ways of bringing a bad stock to an end by stopping reproduction. Idiots and imbeciles aree regarded as children all their days by the law, and provisions are made for the appointment of tutors and curators for them. They are held irresponsible for their acts.

Idiopathic, a term applied to a morbid condition when it arises primarily and not in consequence of some other disease or injury. It is used in contradistinction to symptomatic and traumatic.

Idiosyncrasy, a distinctive peculiarity of the mental or bodily constitution of any person, or that constitution or temperament which is peculiar to any person. The term sometimes corresponds with ANTIPATHY (*q. v.*).

Idocrase, a brown, green, yellow, or pale blue sub-transparent mineral, of vitreous or sub-resinous luster, with double refraction. Hardness, 6.5; sp. gr. 3.35 to 3.45. Dana calls it Vesuvianite, and divides it into an ordinary variety, and cyprine. Under the first are ranked gahnite, frugardite, heteromerite and xanthite. Found at Vesuvius and Mount Somma.

Idolatry, the worship of idols, images, or representations made by hands to represent divinity, or of any inanimate object; the worship of false gods; paganism. According to Sir John Lubbock, idolatry or

anthropomorphism is the fifth of six progressive stages in the history of religion.

Ethnic.—The ancient Egyptians, the Greeks, and the Romans, the modern Chinese, Burmese, Hindus, etc., are all in that fifth stage of religious development.

Jewish.—In all countries where idolatry exists, the tendency is for the uneducated to worship the idol as if it were a deity, while the more enlightened employ it simply as an imagined aid in adoring an unseen God. Many of the denunciations against idolatry in Isaiah's prophecies are leveled chiefly at the first of these (xlii: 17, xliv: 10-17); but some censure also the higher form (xl: 18-25). When Aaron made the golden calf, he proclaimed a feast, not to it, but to Jehovah. This was on his part the higher form (Exod. xxxii: 4, 5), but the people said, "These be thy gods," and worshiped the calf itself (xxxii: 4, 8). The second commandment is directed against idolatry.

Christian.—Images had been introduced into the various churches about A. D. 300 for instruction only: gradually they began to be worshiped. About 726 a controversy arose with regard to their use. The Emperor Leo the Isaurian issued edicts against them, and carried them out with relentless rigor in 736. Between the doll of a girl and the idol of a worshiper there is a close affinity, and it is a noteworthy fact that the restoration of image worship was brought about by the Empress Irene in 780. The second Council of Nice sanctioned them in 787. But in the modern Greek Church, pictures instead of actual images are used. The latter are employed in the Roman Catholic Church. Most Protestant Churches exclude them from their places of worship, or, if they admit them, do so only for ornament.

Idomeneus (ē-dom″en-us″), a King of Crete, succeeded his father Deucalion on the throne, and accompanied the Greeks to the Trojan war with a fleet of 90 ships. During this war he rendered himself famous by his valor. At his return he made a rash vow, in a dangerous tempest, to Neptune, that, if he escaped, he would offer to the god whatever living creature first presented itself to his eye on the Creton shore. This was his son, who came to congratulate him on his safe return. Idomeneus performed his promise, but the inhumanity of this sacrifice rendered him so odious to his subjects that he was exiled from his country. He died in Italy, at an advanced age.

Idra. See HYDRA.

Idria (id′rē-ä), a mining town in the Austrian crownland of Carniola, celebrated for its quicksilver mines (discovered in 1497). Upward of 230 tons of quicksilver are produced annually, and about 20 tons of cinnabar (red sulphuret of mercury).

Idrialin, or **Idrialine,** in chemistry, $C_{42}H_{28}O$, a white crystalline substance, extracted from idrialite. It can be obtained either by dry distillation in an atmosphere of hydrogen or carbon dioxide, or by boiling the mineral in oil of turpentine, the liquid on cooling depositing impure idrialin. It is insoluble in water even on boiling, and very slightly soluble in alcohol and ether. The best solvent is oil of turpentine or amylic alcohol. Heated with sulphuric acid, an intense blue color is formed; with nitric acid an insoluble red powder is produced. Idrialin was long supposed to be a hydrocarbon, but it is now proved to contain oxygen.

Idris (id′ris), a mythical figure in Welsh tradition, supposed to have been at once a giant, a prince, and an astronomer. On the summit of Cader Idris in Merionethshire may be seen his rock-hewn chair, and an ancient tradition told that any Welsh bard who should pass the night upon it would be found next morning either dead, mad, or endowed with supernatural poetic inspiration. This tradition forms the subject of a fine poem by Mrs. Hemans; the gigantic size of the chair is alluded to in Tennyson's "Geraint and Enid."

Idrisi (id′rē-sē), an Arabian geographer, who flourished between 1100 and 1200, and wrote a "Book About the World" which is of importance in the annals of geographical science.

Idun, or **Iduna** (ē-dön′), the name of a goddess of the Northern mythology. She was the daughter of the dwarf Svald; but being received among the Æsir, she became the wife of Bragi.

Idyl, or **Idyll,** a short poem, the subject, or at least a necessary accompaniment of which, is a simple description of pastoral nature, life, and scenery, or of events in pastoral life; as the idyls of Theocritus among the ancients; Goldsmith's "Deserted Village," etc. Tennyson has given the name "Idylls" to a series of poems founded on incidents in the Arthurian legend.

If (ēf), a rocky island in the Gulf of Marseilles, crowned by a castle, the Château d'If, which was built by Francis I. of France, and subsequently used as a state prison. Here were confined, among others, Mirabeau and the Duke of Orleans (Philip Égalité), not to mention "Monte Cristo."

Iffland, August Wilhelm (if′fländ), a German dramatist and actor; born in Hanover, April 19, 1759. He fled his home and theological studies when a mere youth, in order to go on the stage, and soon became a great actor. As a playwright he captured the public with "The Hunters" and "The

Crime of Ambition." He united in a rare degree a mastery of stage-craft with a knowledge of dramatic construction. He died in Berlin, Sept. 22, 1814.

Ifni (if′nē), a small seaport in Southern Morocco, 35 miles S. of Aguilon, ceded to Spain in 1883 in fulfilment of a clause in the treaty signed between the two countries so far back as 1860.

Igarapé (ē-gär-ä-pā′), a canoe-pass, the name given by the Indians to the side-channels or bayous by which the river Amazon is bordered from its mouth up to a great distance.

Igasuric Acid, one of the acids combined with strychnine and brucine in the St. Ignatius bean and in *nux vomica*. It crystallizes in the form of small, hard, granular crystals, which have a sour astringent taste, and are very soluble in water and in alcohol.

Igasurine, an alkaloid discovered in 1853 by Desnoix, in the mother-liquors from which strychnine and brucine had been precipitated by lime. It crystallizes in feathery groups of white silky needles, which have the bitter taste and poisonous properties of strychnine and brucine. The crystals are very soluble in alcohol, slightly soluble in water, and almost insoluble in ether. By treatment with hot water, and fractional distillation, igasurine yields nine distinct bases, all crystalline, bitter, and poisonous. It resembles brucine in its behavior toward reagents.

Iglau (ēg′lou), the second largest town of Moravia; 1,703 feet above sea level, on the Iglawa river; 123 miles N. N. W. of Vienna. It has some old churches (one founded in 799). Its staple industries have always been the manufacture of cloth and woolen goods; glass and tobacco are also manufactured. It has a large trade in corn, flax, wool, cloth, and timber. Here on July 5, 1436, the Emperor Sigismund signed the Prague Compactata, after which he was accepted as king by the Bohemians. In the Thirty Years' War the town was taken by the Swedes and recaptured by the Imperialists.

Iglesias, José Maria (ē-glā′sē-äs), a Mexican historian and publicist; born in the City of Mexico, Jan. 5, 1823; figured very prominently in his country's politics; and wrote: "Contribution to a History of the War between Mexico and the United States" (1852), and a "Historical Review of the French Intervention" (1870).

Iglesias, Miguel, a Peruvian statesman; born in 1822. He led the army in the war with Chile; and was defeated for the presidency in 1886. Died Nov. 8, 1909.

Iglesias, de la Casa, José, (ē-glā′sē-äs dā lä kä′sä), a Spanish poet; born in Salamanca, Oct. 31, 1743. He was a priest in his native diocese, and in conjunction with Melendez, organized a devoted band of poetasters, the fame of which spread far and wide, under the name of the School of Salamanca, exercising in time no ordinary authority over Spanish poetry. His volume of "Light Verse" has, under various titles, passed through numerous editions in Spain, where he will probably always be a classic. He died in Salamanca, Aug. 26, 1791.

Igloolik (ig-lö′lik), an island near the E. end of the Fury and Hecla Strait in the Arctic Ocean; the place where Parry passed the winter of 1822–1823.

Ignacio (ig-nä′sē-ō), a group of islands of Mexico, in the Gulf of California, off the coast of the State of Sinaloa.

Ignacio, Joaquim Jose, a Brazilian naval officer; born in 1808. He effected a brilliant movement on the Paraguay and won notable victories. He died in 1869.

Ignatieff, Nicholas Paulovitch (ig-nät′-ē-ef), a Russian diplomatist; born in St. Petersburg in 1828. He served in the Crimean War, and was made a colonel in 1856. In 1858 he was sent on a special mission to Bokhara and Khiva, and afterward as ambassador to Peking in 1860. He was appointed minister at Constantinople in 1864, and was envoy-extraordinary in 1867–1878. He was conspicuous in the negotiations before and after the Russo–Turkish war, and was appointed minister of the interior, but was dismissed in 1882. He represented the party in favor of war, in opposition to Gortchakoff. He was subsequently governor-general of Irkutsk. He died July 4, 1908.

Ignatius (ig-nā′shus), surnamed THEOPHORUS, a father of the Church, and martyr; a native of Syria, and a disciple of St. John the Evangelist, by whom he was made bishop of Antioch, A. D. 68. After discharging the episcopal office with great zeal for 40 years, the Emperor Trajan, passing through Antioch in his Parthian expedition, sent for him, and endeavored to prevail upon him to renounce his religion. Ignatius continued inflexible; on which the emperor sent him under a guard of soldiers to Rome, where he was exposed to wild beasts in the amphitheater for the amusement of the people. The martyr joyfully heard his sentence, and endured his sufferings with fortitude. Two pious deacons of his church gathered up his bones, and conveyed them to Antioch.

Ignatius, a Church father; born about 798. When his father, the Emperor Michael I., was deposed he entered a monastery, assuming the name of Ignatius. In 846 he was raised to the patriarchate of Constantinople. He was opposed to the Iconoclasts, and his refusal to admit Bardas, brother of

the Empress Theodora, as a communicant, on account of his reported immorality, led to his deposition in 857. The schism between the Greek and Roman Churches began while Photius, his successor, was in office, and has continued ever since. He was reinstated in 867, and at an ecumenical council assembled at Constantinople in 869, Photius and his party were condemned. He died in 878.

Ignatius Bean, the seed of the so-called *Ignatia amara;* but the genus *Ignatia* is now given up, having been founded on fragments of two different plants not akin to each other. Ignatius beans, called in parts of India papeeta, have been given in cases of cholera, but, if an overdose be taken, giddiness and convulsions will ensue. They are supposed to come from a species of *Strychnos,* perhaps *S. multiflora.*

Ignatius of Jesus. See LYNE, JOSEPH.

Ignatius of Loyola. See LOYOLA.

Igneous, in geology, a term applied to all agencies, operations, and results, which seem connected with, or to have arisen from, subterranean heat; and igneous rocks include the Volcanic, Trappean, and Granitic series, all of which are evidently the products of fusion, either in the interior or at the surface of the crust; geologists, consequently, use the term igneous as synonymous with Plutonic, pyrogenous, unstratified, and other similar terms.

Ignis Fatuus (ig′nis făt′u-ŭs), a kind of luminous meteor, which flits about in the air a little above the surface of the earth, and appears chiefly in marshy places, or near stagnant waters, or in churchyards, during the nights of summer. Many instances are related of travelers having been decoyed by these lights into marshy places, where they perished; and hence the names "Jack-with-a-lantern," "Will-o'-th'-wisp"; the people ascribing the appearance to the agency of evil spirits, who take this mode of alluring men to their destruction. This phenomenon has not yet received a satisfactory explanation. The most general opinion is, that it is due to the emanation and spontaneous combustion of some highly inflammable gas, given off by decaying organic matter.

Ignoramus (Latin, "we do not know"), the word formerly written by a grand jury on the back of an indictment, meaning that they rejected it. The word is now used most commonly as a synonym for a blockhead.

Ignorance, a condition held in law to be no excuse for any breach of contract or duty, or for crime or other offense. It is absolutely necessary to start with this maxim, otherwise it would be quite impossible to administer the law; for if once a contrary maxim were allowed it would not only be a premium to ignorance, but would lead to endless and abortive inquiries into the interior of a man's mind. Ignorance of a fact, however, is a different thing. Another kindred maxim of the law is that every man intends the consequences of his own act. Thus, if he shoot at or give poison to a person it is presumed that he intended to kill such person. So, if he leave a trap door open in a street or thoroughfare it is held that he intended people to fall into it and be injured. There is, however, a doctrine called *bona fides,* which, in the case of petty offenses often tempers the strict and rigid application of the maxim, *ignorantia juris neminem excusat;* and even in crimes a judge always takes into consideration, when passing judgment, whether the prisoner or defendant was an ignorant or intelligent person. In Catholic theology, a man is never excused for sin, whether of omission or of commission, on the plea

IGUANA.

of ignorance which he can be fairly expected to overcome, of "vincible" or willful ignorance; whereas "invincible" ignorance which a man could not help or abate, altogether excuses from guilt.

Ignorantines (ig-nor-an′tēns), a Roman Catholic association for the gratuitous instruction of poor children in secular and religious knowledge, founded in France by the Abbé de la Salle in 1724. It has been introduced into other Roman Catholic countries. The brethren, expelled from France at the Revolution, were recalled in 1806 by Napoleon I.

Igor I. (ē′gor), a grand duke of Russia; succeeded his father Rurik, and, after making war a long time against his neighbors, proceeded to ravage the East, deluging with blood Pontus, Paphlagonia, and Bith-

ynia. He left his throne to his wife Olga, who in her old age embraced Christianity. He died in 935.

Igor II., was grand-duke in 1146. There is a noted Russian military epic called the "Tale of Igor."

Iguala (ē-gwä'lä), a town in Guerrero, Mexico; pop. (1900) est. 8,500. It is an industrial center. The so-called "Plan of Iguala" got its designation from this place.

Iguana, a genus of saurian reptiles, the type of the extensive family of the *Iguanida*, is a native of Brazil, Cayenne, the Bahamas, and neighboring localities in the New World. It was formerly very common in Jamaica, but is now becoming gradually rarer. It has a lizard-like form, with a long tail, and an average length of about four feet, though it sometimes reaches a length of fully six feet. Its head is large and covered with large scales; the mouth is wide and studded around the edge with teeth, round at the roots, swollen and slightly compressed at the tip and notched on the edge. The palate is generally furnished with rows of small teeth. The food of the *Iguana* consists almost entirely of fruits, fungi, and other vegetable substances, though it occasionally feeds on eggs, insects, and various animal substances. When domesticated it eats leaves and flowers. Along the whole length of the back to the tip of the tail there is a crest of elevated, compressed, pointed scales, while over the lower part of the head and neck there is a deep, thin dewlap or throat pouch, the border describing a curved line and dentilated at the part nearest the chin. The toes of the feet, five in number, are furnished with sharp claws, which enable it to climb trees with ease, while a rapid serpentine movement of its tail propels it swiftly through the water, immersion in which for an hour it has been known to endure with perfect immunity. Its usual color is dark olive green, but it varies in the same individual, being affected by weather, locality, or temper. Its flesh is considered a delicacy, being tender and delicately flavored, resembling the breast of a spring chicken, and is freely used by all classes of persons. The animal, therefore, is keenly hunted, being taken by means of a noose thrown over its neck, or by nets. Dogs are trained to run it down and secure it without killing it. The eggs, of which the female lays from four to six dozen, are also eaten, having an excellent flavor. They are about the size of those of a pigeon, are laid in the sand, and hatched by the heat of the sun. There are peculiar constitutions and certain forms of disease on which the flesh and eggs of the *Iguana* act injuriously.

Iguanida, a family of Lacertian reptiles belonging to that group which possesses a columella (*Kionocrania*), whose vertebræ are concave anteriorly (*Procœlia*), and which have epidermic plates on the head. The family is properly restricted to arboreal forms, the terrestrial genera belonging to the group *Agamida*. The family characters of *Iguanida* are: body rounded, moderately thick, sometimes laterally compressed and furnished with a ridge, vertical plate, or serrated crest along the middle line of the back from snout to tip of tail, and even on the under surface of the tail, the head in some elevated, helmet-like; throat pouch or dewlap occasionally present. Some change color, chameleon-like. The dentition is either acrodont, the teeth being placed on the summit of the jaw, or pleurodont, when they are borne by an outer lateral plate. The former condition is found in *Histiurus, Chlamydosaurus, Draco,* the latter in *Iguana, Basiliscus, Cyclura.* The dewlap is a singular structure, very bovine in *Iguana,* but in the dragons (*Draco*) reduced to a conical sac, not hollow, and not in any way connected with the larynx. The scales vary in character, being in *Iguana* polygonal or rounded on the head, and tuberculous or carinated; small and circular on eyelids, large quadrangular on lips; rhombic and diagonally keeled on the under surface of the body. To these examples of variation in size and shape must be added the thick, conical, laterally compressed spines which traverse the middle line from the skull to near the tip of the tail. The anterior teeth of *Iguana* are rounded on the summit, the posterior assuming more and more distinct serrations. The type species, *I. tuberculata,* attains a length of five feet. It is of a greenish tint, yellow predominating on the under surface of the body, blue modifying that of the upper. The sides are marked with yellow zigzags, in the middle of which is a dark brown band. The tail is surrounded by alternate brown and yellowish green bands. The genus *Draco,* whose metropolis is in Asia, is remarkable for the possession of a patagium or parachute-like expansion of the integument of the sides of the body from the shoulder to the flank. The membrane is supported by rib-like processes, and is not a wing, but simply when expanded allows the animal to glide through the air from a higher to a lower level. Some of these forms are smaller than many tropical butterflies, and their colorings are similar to those of nocturnal moths. The *Agamida* have as a rule shorter limbs and tails, flat bodies and spines scattered over the surface. The outer aspect of the genera ranges from that of the ordinary lizard to one strikingly like that of the toad. The *Agama* has a collaret of spines; the Egyptian *Uromastyx* has, as its name indicates, only caudal circlets of spines; the Australian *Moloch* and the American *Phrynosoma* are set all over with dermal spines, from which a thin epidermal sheath

may be removed. The *Agamida* are not of special value, but *Iguana* is highly prized as an article of food. The dropping of the tail so frequent among the *Iguanida* either after an injury or when the member is seized is associated with the presence in each vertebra of an unossified septum equidistant from either end. Through this line of weakness the appendage breaks, and the fracture being an irregular one there is no hemorrhage. The lost portion is reproduced, but does not for a long time attain the dimensions of the rest of the tail.

Iguanodon, the largest known quadruped; was a denizen of South England during the later Tertiary times. It belongs to the group of *Ornithoscelida* (*Dinosauria*), an assemblage of reptiles whose pelvic bones are strikingly like those of birds, especially in the elongation and slenderness of the ischium, and in *Iguanodon* there is midway in its length the obturator process as in birds. The integument of *Iguanodon* does not seem to have possessed the spines or bony plates of allied species. The anterior vertebræ were slightly amphicœlous or biconcave; the posterior flat. The premaxillæ were beak-like and without teeth, and the lower jaw is notched for the reception of the beak, as in the parrot. The teeth were large and broad, implanted in sockets, but not anchylosed to the jaw. They were transversely ridged, at first trenchant, but becoming ground by friction so as to present a surface as varied as that of the ruminant, to which there is this additional resemblance, that the former has a process answering to a third trochanter. The size attained by these reptiles was overestimated by Mantell and Buckland at 70 feet: Owen's calculation is 30 feet, a size still gigantic enough to impress strongly on the imagination the extent of that continent which formed the dry land of the cretaceous ocean and the abundance and large dimensions of its vegetation.

Ihre (ē′re), **Johan,** a Swedish scholar; born in Lund in 1707. He was educated at the University of Upsala; and rose through a variety of offices to be Professor of Belles-lettres and Political Economy (1748). Ihre's principal work is his "Swedo-Gothic Glossary" (1769), a work of great talent and erudition, which, though a product of the pre-scientific age, may in some respects be regarded as the foundation of Swedish philology. It was issued at the cost of the state. Another work of lasting value is the "Dictionary of Swedish Dialects" (1766). He died in 1780.

Ilchester, an ancient English village of Somersetshire. Supposed to be the "Ischalis" of Ptolemy, it was the principal station of the Romans in this region. Numerous Roman remains have been found here

Ildefonso, San, a town of Spain, province of New Castile, on the Cogolludo river, 40 miles from Madrid. The town contains a magnificent palace built by Philip V., also a large plate glass manufactory.

Ile-de-France (ēl″dä-frä*ngs*″), one of the old provinces of France, having Paris as its capital, and now mostly comprised in the departments of Seine, Seine-et-Oise, Aisne, Seine-et-Marne, Somme, and Oise. In the middle of the 9th century it was made a dukedom, and became one of the four constituent fiefs of the French monarchy. The 2d duke, Odo, commonly called Count of Paris, was crowned King of France in 888. His successors contended for some years for the throne of France; one of them, Hugh Capet, founded in 987 the Capetian dynasty. Ile-de-France was formerly the name of Mauritius.

Ilerda. See LERIDA.

Iletzk (il′etsk), a town in the Russian government of Orenburg, near the confluence of the Ilek with the Ural. Close by is the richest salt-bed in Russia, yielding nearly 21,700 tons of salt annually. It was discovered by Pallas in 1769, and visited by Murchison in 1850.

Ileum, the portion of the small intestines communicating with the larger intestine. It is formed by one of the folds of the peritoneum. Sometimes there is a pouch or diverticulum from the main tube.

Ileus, or **Iliac Passion,** a severe intestinal disease, characterized by violent griping pain, accompanied with retraction and spasms of the abdominal muscles, costiveness, and vomiting of fæcal matter. It arises from many causes, and is generally symptomatic of some other disease. Among the most frequent causes of this disease are strangulated hernia, intussusception, or the retention of one part of the bowel within another, unnatural adhesions between adjacent folds of the intestines, inflammation, etc. The medical treatment consists in removing the exciting cause. If there is evidence of an inflammatory state, blood should be freely abstracted from the arm, and leeches applied to the abdomen. For the rest, carminative aperients, fomentations, warm baths, and warm and copious glysters, and blisters are to be used. Dry and humid fomentations, warm baths, and warm and copious glysters, afford the most reasonable chance of success.

Ilex, a tree often named in the Latin classics, the evergreen oak or holm oak (*Quercus Ilex*). It is a native of most parts of the S. of Europe and of the N. of Africa, often attaining large dimensions, as it sometimes does where planted in Great Britain. It grows in general singly or in small groups, and loves the vicinity of the sea. Its leaves are ovate-oblong, acute,

leathery, hoary beneath; but they vary much in some respects, from the size of a sloe leaf to that of a beech, and from being very spiny at the edge to perfect evenness. The bark is very astringent, and is employed for tanning hides in the countries to which the tree is indigenous. Its wood is very hard and heavy, tough, durable, and useful, particularly for axles, pulleys, screws, and whatever is to be subjected to much friction. The acorns are of various quality, sometimes bitter, and sometimes sweet and eatable. In modern botany ilex is the generic name of the holly.

Ilfracombe, a watering place of England, finely situated on the picturesque rocky coast of North Devon, on a cove or inlet of the Bristol Channel. Though having now nothing more than a little coasting trade and fishing, Ilfracombe was in the 14th century a port of some consequence, and contributed six vessels to the English fleet for the siege of Calais.

Ili (il′ē), a river of Central Asia, partly in Chinese territory, but mostly in Russian. It is formed in Chinese Kuldja by two streams, the Tekes and Kunges, rising in the Thian-shan Mountains, and flows W., falling into Lake Balkash by several mouths after a course of 800 or 900 miles, half of which is navigable.

Iliad, a celebrated epic poem in the Greek language, consisting of 24 books. Its composition is generally ascribed to Homer of whose parentage, birth, and life nothing is known for certain. It is, however, a matter of dispute as to whether the poem is a homogeneous whole, or a series of ballads or rhapsodies on different episodes in the Trojan War, united into a continuous poem. It is further doubtful whether, in the latter case, the union was made by Homer himself, or by some person after his time. It is said that Pisistratus, tyrant of Athens, first collected and arranged the "Iliad" and "Odyssey" in the form in which we now have them. The chief subject of the poem is the wrath of Achilles, and the consequent troubles thence arising, whence we have the phrase *Ilias malorum* = an Iliad of woes or troubles, a world of disasters. The reader of the poem is assumed to know that the beautiful Helen has been carried off by Paris from her husband Menelaus. The action of the poem is confined to the 10th and last year of the siege of Troy. See Homer.

Ilicin (ī′lis-in), a bitter principle extracted from the leaves of the holly. In its crude state it is a jelly, but when purified it crystallizes in the form of brownish-yellow crystals, which are intensely bitter. Ilicin is soluble in water and alcohol, but insoluble in ether. It has been recommended as a febrifuge, in doses of from 6 to 20 grains.

Ilissus (il-is′us), a rivulet of Greece, famous in the classical age, but now unimportant and often wholly dry.

Ilithyia (il-ith-ī′yä) among the Greeks the goddess who assisted women in childbirth. In after times she was almost identified with Artemis (Diana).

Ilium, or **Ilion,** a name of Troy, in Greece, which was founded by Ilus.

Iliyats (il′ē-yats), a nomadic race of Persia, Khiva, and Turkestan. The name Iliyat is the plural of *iel* (eel), a tribe, equivalent to the Arabic *kabilah.* The Iliyats are mostly of Turkish, Arabic, and Kurdish descent, and form an important portion of the population of Persia and adjacent countries; their actual numbers are not known, but it is said that the Iliyat tribes tributary to Khiva number 195,000. They live in tents and have no settled habitations. They are Mohammedans of the Sunni sect, but are not very strict. The women are said to be chaste, and many of the best families in Persia are of Iliyat origin.

Illampu. See Sorata.

Ille-et-Vilaine (ē-lā-vē-lān′), a maritime French department, formed out of the N. E. portion of the old province of Brittany; area, 2,697 square miles; pop. (1906) 611,805; mostly of Celtic race. It is watered chiefly by the Vilaine and its tributary, the Ille, which unite near Rennes, the capital of the department. Ille-et-Vilaine consists of a granite plateau traversed by ranges of low hills. It is agricultural, cultivation having been greatly improved during recent years. The cider of this district is the best in France; the butter of Rennes is celebrated; the horses of the department are noted for their endurance, and are in great request for the army; and bee keeping is prosecuted. Iron is mined; slates are quarried; and salt is extracted. St. Malo is the principal seaport.

Illegitimacy, a state of being illegitimate; state of being born out of wedlock; the state of bastardy. A state of being not genuine, or of legitimate origin.

Illicium (il-lis′ē-um), a genus of *Magnoliads,* tribe *Wintereæ.* The fruit and other parts of *Illicium anisatum* is used by the Chinese as a stomachic and carminative, and as a spice. The fruit yields by distillation an oil like that of anise, used chiefly in the manufacture of liquors. *I. floridanum* is also spicy. The fragrant seeds of *I. religiosum* are burnt by the Chinese in their temples.

Illimani (il-yē-mä′nē), one of the loftiest peaks in the Bolivian Andes, fully 21,000 feet high, and covered with glaciers.

Illinois, a State in the North Central Division of the North American Union; bounded by Indiana, Kentucky, Missouri, Iowa, Wisconsin, and Lake Michigan; admitted to the Union, Dec. 3, 1818; number of counties, 102; capital, Springfield; area, 56,650 square miles; pop. (1890) 3,826,351; (1900) 4,821,550; (1910) 5,638,591.

Topography.—The surface of the State is generally flat, rising in an inclined plane from depression of 300 feet near Cairo, to an elevation of 820 feet in Jo Daviess county. A spur of the Ozark Mountains crosses the S. part of the State. The principal physical features of the State are the great prairies or natural meadows, from which Illinois derives its popular name, the "Prairie State." The river system of Illinois is the most extensive in the Union. The Mississippi forms its entire W. boundary, and its great E. tributary, the Ohio, with its affluents, the Illinois, Wabash, Kankakee, Des Plaines, Kankaskia, Mackinaw, Sangamon, Vermilion, and their numerous tributaries, form a water system of over 280 streams. The Illinois river broadens out into an extensive basin, known as Lake Peoria in the central part of the State. This, with Lake Pishtaka in the extreme N. E. comprises the lake system of Illinois. There are numerous natural points of interest, among them being Starved Rock, a mass of sand and limestone rising abruptly to a height of 160 feet. Fountain Bluff, 6 miles in circumference and 300 feet high, and a large cave in Hardin county, on the Ohio river, formerly a noted retreat for river pirates.

Geology.—The N. part of the State shows Silurian origin, with Tertiary and Post-Tertiary formations in the S., and Devonian strata in the S hills. Geological research seems to show that the Great Lakes were once connected with the gulf through the channels of the Illinois and Mississippi rivers, the whole region being an immense lake. Fresh water shells have been found in the Post-Tertiary clays and sands on the lake shore and marine shells are found in the soil of the prairies. Along the Mississippi river are steep bluffs of lime and sandstone, called from their form, Castle Rocks.

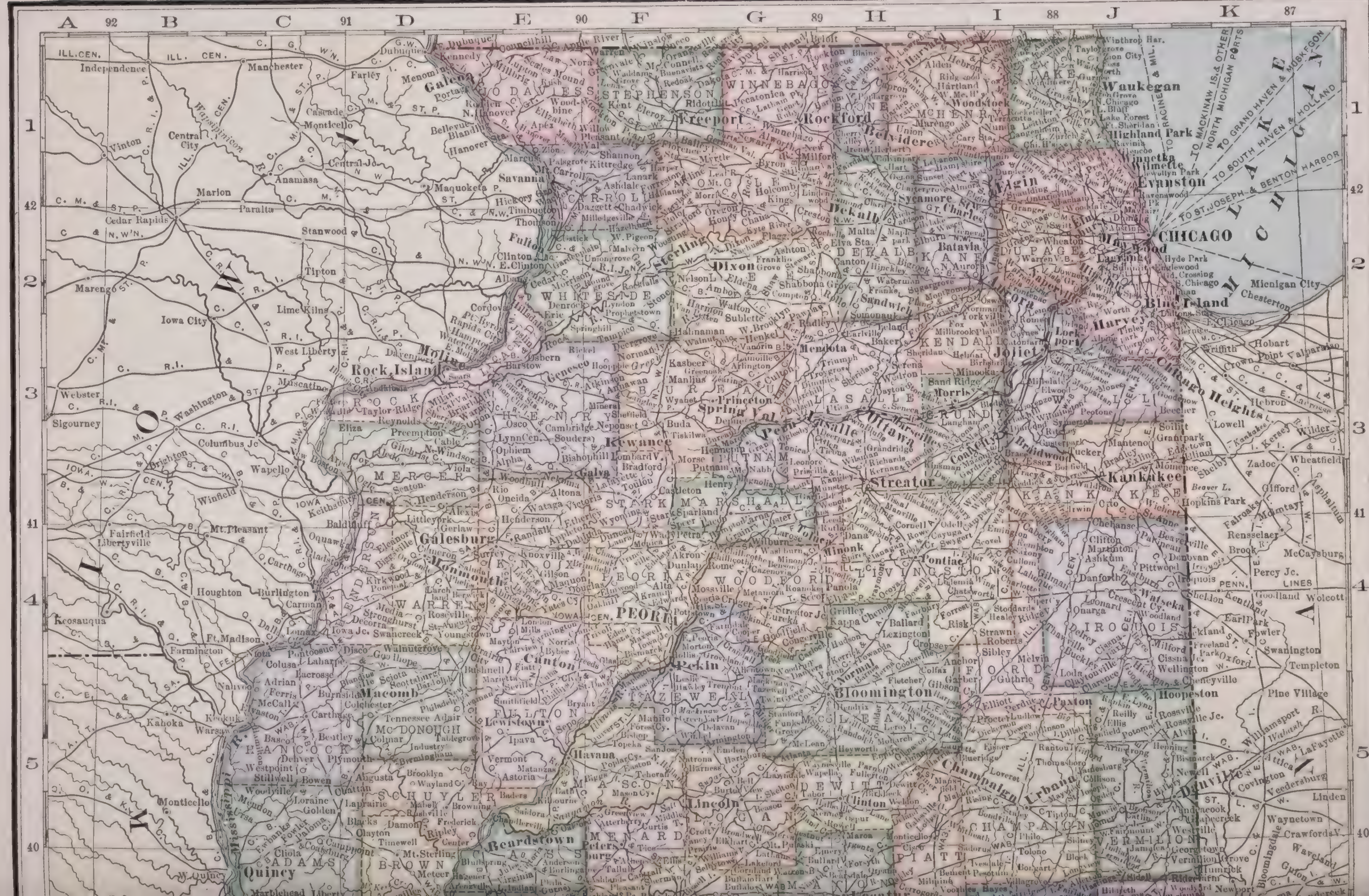
Mineralogy.—Bituminous coal is found in a field, 375 miles long by 200 miles broad, usually in the form of cannel coal, though some excellent smelting coal is also found. The coal production in 1899 was 24,439,019 short tons, valued at $20,744,553, making the State second in the United States in this product. Though but little iron exists in Illinois, its fuel advantages gives it third place in the Union in the treatment of iron ores; the production of Bessemer pig iron in 1899 was 1,330,169 long tons; Bessemer steel, 1,211,264 long tons; and open-hearth steel, 246,183 long tons. Other important mineral productions were mineral waters, 738,300 gallons, valued at $59,670; clay, 71,000 tons, valued at $100,000; natural gas, valued at $2,067; and petroleum, 360 barrels. Besides these, there are deposits of lead, copper, gypsum, limestone, and marble.

Soil.—The soil is generally black, light, rich, and warm, and free from stones and pebbles, though in places it is mixed with a siliceous sand. It is exceedingly fertile. Some places the loam has a depth of 25 feet. The prairie lands consist of the original diluvial sediment, overlaid with decomposed vegetable matter. The "American Bottom," 5 miles in width and extending 90 miles along the Mississippi, has been cultivated ever since the first settlement, and its fertility still seems inexhaustible. The most abundant forest trees are the oak, black walnut, ash, hickory, sugar maple, locust, elm, linden, tulip, buckeye, poplar, beech, yellow pine, cyprus, cedar, pecan, sycamore, cottonwood, and black birch.

Agriculture.—Illinois is one of the foremost States in agriculture. The fertility of its soil makes it especially adaptable for the raising of cereals, farm and garden vegetables, and fruit. Among its chief products are raspberries, strawberries, cherries, plums, peaches, grapes, apples, potatoes, tobacco, maple sugar, hops, flaxseed and broomcorn. In 1900 the principal crops were corn, 264,176,226 bushels, valued at $84,536,392; oats, 133,642,884 bushels, valued at $30,737,863; hay, 2,119,419 tons, valued at $17,803,120; wheat, 17,982,068 bushels valued at $11,508,524; potatoes, 15,296,104 bushels, valued at $6,271,403; rye, 1,270,684 bushels, valued at $597,221; barley, 342,144 bushels, valued at $16,808; and buckwheat, 67,140 bushels, valued at $43,641. The farm animals reported Jan. 1, 1900, were horses, 983,233, valued at $48,486,673; mules, 78,936, valued at $4,245,658; sheep, 637,719, valued at $2,532,383; milch cows, 1,021,236, valued at $37,070,867; and other cattle, 1,303,018, valued at $41,197,518.

Manufactures.—According to the Federal census of 1900 there were 38,360 manufacturing establishments employing $776,829,598 capital, 395,110 persons; paying $191,510,962 for wages, $739,754,414 for materials; yielding products of a combined value of $1,259,571,105. The principal industries were slaughtering, meat packing, and the manufacture of iron and steel. See CHICAGO.

Banking.—On Oct. 31, 1901, there were 256 National banks in operation, having $39,219,100 in capital, $18,772,790 in outstanding circulation, and $17,529,600 in United States bonds. There were also 161 State banks with $19,575,000 capital, and


A 92 B C 91 D E 90 F G 89 H I 88 J K 87
1
42
2
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41
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40
ILL. CEN.
Independence
Manchester
Farley
Dubuque
Galena
Kennedy
Millbrig
Scales Mound
Council Hill
Apple River
Warren
Winslow
Orangeville
Rock City
Durand
Shirland
Harlem
Rockton
Roscoe
Blaine
Caledonia
Argyle
Richmond
Hebron
Alden
Marengo
Hartland
Woodstock
Ridgefield
Nunda
Leithton
Langenheim
Zurich
Ringwood
Volo
Fox Lake
Grayslake
Gurnee
Waukegan
Winthrop Har.
Taylor Grove
Zion City
Glen Flora
Waukegan
N. Chicago
L. Bluff
Lake Forest
Ft. Sheridan
Highland Park
Ravinia
Glencoe
Winnetka
Wilmette
Evanston
Lewellyn Park
Barrenswood
Maywood
Melrose Park
Hyde Park
Englewood
Mid. Crossing
S. Chicago
CHICAGO
Blue Island
Harvey
Lockport
Joliet
Chicago Heights
Michigan City
Chesterton
Hobart
Crown Point
Valparaiso
Griffith
Lowell
Wilder
Kersey
Kankakee
Momence
Shelby
Zadoc
Wheatfield
Clifford
Hopkins Park
Beaver L.
Falroaks
Momtaz
Rensselaer
Brook
McCaysburg
Percy Jc.
LINES
Woodland
Wolcott
Earl Park
Fowler
Swanington
Templeton
Pine Village
Williamsport
Attica
LaFayette
Covington
Veedersburg
Linden
Waynetown
Crawfordsv.
Wavelland
Bloomingdale
Galton
Wabash
Danville
Westville
Vermilion
Georgetown
Grove
Tilmick
Newport
Jamaica
Sidell
Ridge Farm
Indianola
Armstrong
Bismarck
Henning
Rossville
Rossville Jc.
Alvin
Hoopeston
Cheneyville
Loda
Buckley
Clarence
Gilman
Thawville
Delroy
Cissna Park
Cissna Jc.
Wellington
Oxford
Freeland
Park
Wilford
Onarga
Crescent Cy.
Woodland
Watseka
Sheldon
Kentland
Leonard
Danforth
Ashkum
Pittwood
Iroquois
Chebanse
Clifton
Momence
Bradley
Exline
Bonfield
Essex
Bridgeport
Tracy
Reddick
Custer Park
Tucker
Manteno
Grantpark
Edgetown
Soiltit
Elliott
Peotone
Symerton
Beecher
Goodenow
Crete
Monee
Lansing
Thornton
Dolton
Riverdale
Calumet
Pullman
Roseland
Kensington
Morgan Park
Beverly
Worth
Palos
Orland
Tinley
Frankfort
Mokena
New Lenox
Manhattan
Peotone
Wilmington
Braidwood
Coal City
Diamond
Carbon Hill
Gardner
Minooka
Sand Ridge
Morris
Seneca
Marseilles
Ottawa
Utica
Deer Park
Dayton
Stoddard
Healey
Ridge
Strawn
Roberts
Sibley
Melvin
Guthrie
Forrest
Risk
Ballard
Lexington
Cropsey
Anchor
Colfax
Gibson
Garber
Gibson Cy.
Fletcher
Elliott
Perdue
Ludlow
Paxton
Rantoul
Thomasboro
Loveret
Champaign
Urbana
Mahomet
Rising
Bondville
Sidney
Philo
Tolono
Longview
Bement
Pesotum
Villa Grove
Homer
Fairmount
Catlin
Tilton
Danville
Vincennes
Chapercreek
Westville
Vermilion
Georgetown
Grove
Tilmick
Newport
Ridge Farm
Sidell
Jamaica

ILLINOIS

State Capital ⊛ **County Seats** ⊙

SCALE OF MILES

10 5 0 10 20 30 40 50

Hammond's 8 x 11 Map of Illinois
Copyright, 1904 by C. S. Hammond & Co.

Longitude West 90 from Greenwich

92 B C 91 D E F G 89 H I 88 J K

7 8 9 10 11 37 38 39

$10,263,226 surplus; 157 private banks, with $2,702,745 capital and $410,196 surplus; and 15 trust and loan companies with $8,560,000 capital, and $4,868,806 surplus. In the year ending Sept. 30, 1901, the exchanges at the United States clearing houses at Chicago, Springfield, Rockford, Quincy, and Peoria, aggregated $7,587,385,012, an increase over the previous year of $623,810,433.

Education.— In 1899 the school population was 1,431,000; the enrollment in public schools, 945,143; and the average daily attendance, 726,782. There were 12,762 public school buildings; 25,947 teachers; public school property valued at $49,138,724; receipts of the year, $17,928,434; and expenditures, $17,650,606. For higher education there were 343 public high schools, 65 private secondary schools, 3 public and 8 private normal schools, 31 universities and colleges for men and for both sexes, and 4 colleges for women. Among the most notable colleges are the University of Chicago, Northwestern University, at Evanston, University of Illinois, at Champaign, Lake Forest University, at Lake Forest, Knox College, at Galesburg, Augustana College at Rock Island, and Northwestern College, at Napierville.

Churches.— The strongest denominations in the State are the Roman Catholics, Methodist Episcopal, Baptist, Lutheran, Synodical Conference, Disciples of Christ, Presbyterian, German, Evangelical Synod, Congregational, Protestant Episcopal, and United Brethren. In 1899 there were 7,965 Evangelical Sunday-schools, with 93,591 officers and teachers, and 698,623 scholars.

Railroads.—The total length of railroads within the State, Jan. 1, 1901, was 11,035 miles, of which 94 miles were constructed during the previous year.

Postoffices and Periodicals.— In 1901 there were 2,626 postoffices of all grades, and 1,726 periodicals of which 182 were daily, 3 tri-weekly, 48 semi-weekly, 1,104 weekly, 6 bi-weekly, 29 semi-monthly, 326 monthly, 1 semi-quarterly, 9 bi-monthly, and 18 quarterly.

Finances.— The total equalized valuation of all taxable property in 1900 amounted to $809,733,405, and the tax rate was $5.00 per $1,000. Under the law the assessed value of property is one-fifth of its fair cash value. On April 1, 1901, the State had no bonded debt, except $18,500 in bonds, which had ceased to draw interest, but had not been surrendered for payment.

State Government.— The governor is elected for a term of four years and receives a salary of $6,000 per annum. Legislative sessions are held biennially and have no time limit. The Legislature has 51 members in the Senate and 153 in the House, each of whom receives $1,000 per session. There are 25 representatives in Congress. The

State government in 1904 was Republican.

History.— The first white settlement in Illinois was the Jesuit mission at the Indian village Kaskaskia, founded by Marquette in 1673. In 1679 La Salle built Fort Crevecœur on the Illinois river near Lake Peoria, and in 1680 established a colony there. After the cession of Canada and the French possessions E. of the Mississippi to England in 1763, Illinois was considered part of Virginia, and in 1778 a military force from there seized Kaskaskia and obtained allegiance from the inhabitants. It was part of a county of Virginia till 1787, when it became part of the Northwest Territory, and in 1809 it became the Territory of Illinois. On Aug. 15, 1812, the garrison of Fort Chicago, and nearly all the settlers nearby were massacred by the Indian allies of the British. Illinois was admitted to the Union in 1818 and in 1832 the Black Hawk War broke out. Several massacres occurred, but the Fox and Sac Indians were finally removed from the State. Hostility to the Mormons led to the murder, by a mob, of the founders of the sect, Hiram and Joseph Smith, in 1844, and the subsequent emigration of the Mormons from the State. In 1847 a new constitution was framed and in 1870 the present one.

J. McCann Davis.

Illinois, a confederacy of five tribes of North American Indians, comprising the Peoria, Kaskaskia, Cahokia, Tamaroa, and Michegamia. They formerly occupied Illinois and adjacent parts of Wisconsin, Iowa, and Missouri. They were constantly at war with the Iroquois. The assassination of Pontiac by a Kaskaskia in 1765 was avenged by the Lake tribes in a war of destruction.

Illinois River, the largest river in Illinois; formed in Grundy county by the union of the Des Plaines and Kankakee rivers, and flowing a general W. and S. W. course, enters the Mississippi river at Grafton, between Jersey and Calhoun counties. During its course it receives several rivers of considerable size, and affords communication between important towns and villages, being navigable for steamboats for about 286 miles above its mouth.

Illinois, The, a United States battleship; launched at Newport News, Va., Oct. 4, 1898. In its main features the "Illinois" resembles the "Oregon," but is larger by 1,000 tons. It is 368 feet in length on load waterline; beam, extreme, 72 feet, 2½ inches; draught on normal displacement of 11,525 tons, 23 feet 6 inches; maximum displacement, all ammunition and stores on board, 12,325 tons; maximum horse power, 10,000; speed, 16½ knots; normal coal supply, 800 tons; full bunker capacity, 1,400 to 1,500 tons; complement of officers, 40; seamen, marines, etc., 449. The main battery consists of four 13-inch breech-loading rifles,

and fourteen 6-inch rapid-fire guns. The secondary battery consists of sixteen 6-pounder rapid-fire guns, four 1-pounder rapid-fire guns, two colt and two field guns, and four torpedo tubes. The armor belt, which extends from the stern to abaft the after turret is 16½ inches thick at the top and 9½ inches thick at the bottom; except at the forward end, where it is tapered to 4 inches at the stem.

Illinois, University of, a coeducational non-sectarian institution in Urbana, Ill.; chartered in 1867; has grounds and buildings valued at over $2,000,000; endowment, about $650,000; scientific apparatus, etc., $700,000; ordinary income, about $1,900,000; volumes in the library, over 135,000; average number of faculty, 540; average student attendance, including summer school, 5,300; graduates, over 7,000.

Illinois Wesleyan University, a coeducational institution in Bloomington, Ill.; founded in 1850 under the auspices of the Methodist Episcopal Church; has endowment funds of about $175,000; grounds and buildings valued at over $140,000; scientific apparatus, etc., $71,000; volumes in the library, about 11,000; ordinary income, $25,000; average number of faculty, 50; average student attendance, 900.

Illuminati (il-yū-mē-nā′tī or il-öm-ē-nä′-tē), a Spanish sect, known vernacularly as Alumbrados. Their founders were Catherine de Jesus, a Carmelite nun, and John de Willelpando, a native of Teneriffe. They rejected the sacraments, and held that by mental prayer they might attain such perfection as to dispense with good works, and that they might commit any crime without sin. Ignatius Loyola, while a student at Salamanca (1527), was tried by an ecclesiastical commission for sympathy with the views of this sect, but declared innocent. Also an obscure sect of French Familists, which arose in Picardy in 1634. Like their predecessors they ran into wild Antinomianism.

The name has been given to many secret societies professing high aims. The Rosicrucians were so called, but generally by this title are designated the members of a society formed at Ingolstadt, in 1776, by Adam Weishaupt, Professor of Canon Law, and an ex-Jesuit. It had some resemblance to, and received substantial support from, Freemasonry, and many educated men of liberal views joined it. Its objects were religious and political emancipation, its ideal form of government republican, and its religion deistic. Espionage and a kind of confession, which Weishaupt's experience among the Jesuits led him to adopt, caused dissensions. The Baron von Knigge, one of the principal members, quarreled with Weishaupt; the order was suppressed by edict, March 2, 1785, and Weishaupt was degraded and banished. The Illuminati were supposed to exercise great political influence; but it is now believed that the views of Barruel and Robison on that subject were exaggerated.

Illumination of Manuscripts, the art of painting manuscripts with miniatures and ornaments, an art of the most remote antiquity. The Egyptian papyri containing portions of the Ritual or "Book of the Dead" are ornamented with veritable drawings and colored pictures. Except these papyri, no other manuscripts of antiquity were, strictly speaking, illuminated; such Greek and Roman manuscripts of the 1st century as have reached the present day being written only. Pliny, indeed, mentions from Varro that authors had their portraits painted on their works, and refers to a biographical work, with numerous portraits introduced, but all such have disappeared in the wreck of ages; the oldest illuminated MSS. which have survived being the "Dioscorides" of Vienna and the "Vergil" of the Vatican, both of the 4th century, and ornamented with vignettes or pictures in the Byzantine style of art. The art of illuminating manuscripts with gold and silver letters is supposed to have been derived from Egypt, but it is remarkable that no papyrus has any gold or silver introduced into it. The artists who painted in gold, called "Chrysographi," are mentioned as early as the 2d century. One of the oldest manuscripts of this style is the "Codex Argenteus" of Ulfilas (360 A. D.); and the charter of foundation of Newminster at Winchester by King Edgar (966 A. D.), six centuries later, shows the use of these letters. Gold letters seem to have been used in the East during the 12th and 13th centuries. At an early period the use of illuminated or decorated initial letters commenced — to be distinguished from the illuminated or painted pages placed at the head of Byzantine manuscripts. Originally they were not larger than the text, or more colored; but the Syriac manuscripts of the 7th century have them with a pattern or border; and they go on increasing in size and splendor from the 8th to the 11th century, when large initial letters, sometimes decorated with little pictures or miniatures, came into fashion in the Greek and Latin manuscripts. The subjects of the figures mixed up with the arabesque ornaments often referred to the texts; warriors and warlike groups of figures being introduced when the text referred to war, symbolical representations of hell where the chapters following treated on that region. These initial letters soon increased to a great size, being from 2 to 24 inches long; they were most used in the 8th and 9th centuries, but continued till the

12th century, and degenerated in the 16th to the last decadence of art — the grotesque.

In the reign of Louis XVI. the art became extinct, ending with a style of painting called *camaïeu gris*, a kind of monochrome, in which the lights are white or gold, and shaded so as to emulate bas-reliefs. Among Oriental nations, the Persians, Hindus, and Chinese have illuminated manuscripts of great beauty, none of which, however, can compete with those of the western nations in antiquity. For beauty of design some of the Arab manuscripts are charming, but their antiquity does not reach beyond the 13th century. The Chinese Buddhists have also illuminated classics, or religious books of their sect, one of which, the "Diamond Book," as it is called, in the British Museum, has a text splendidly printed in silver and gold letters on a blue ground, and the vignettes charmingly painted in tempera, on macerated leaves of the "Ficus Indica."

Illusions, conditions usually distinguished as having some basis in outward physical facts, from delusions, which are purely subjective hallucinations, with no foundation save perverted imagination, or otherwise disordered faculties. Optical illusions are exemplified by the appearances connected with mirage.

Illustration of Books, the art of making and reproducing pictures to supplement or adorn the text. In England book illustration may be said to have reached its culminating point as regards engraved and etched plates in the first half of the 19th century, in the series of annuals, keepsakes, and the higher class books illustrated by such masters as Stothard, Turner, etc. The revival of wood engraving by Bewick and his pupils gradually led to the restoration of that art as an illustrating medium. In this it was greatly aided by the facility with which wood-engravings can be printed along with the text, together with the advance made in typographic printing. The series of Christmas books illustrated by John(afterward Sir John) Gilbert and Birket Foster had no small share in that advancement. Among the artists who have helped to raise the art to its present high position may be mentioned Cruikshank, H. K. Browne ("Phiz"), Doyle, Leech, Tenniel, Millais, F. Walker, W. J. Linton, Herkomer, etc. The development of what has been called the American school of wood-engraving has still further increased the influence of that branch of art for illustrative purposes.

Relief-Block Processes for Book Illustrations.— Many processes have been invented to produce relief blocks with a view to supersede wood-engraving in book illustration. The object aimed at is to reproduce drawings in line or wash, in fac-simile, on a relief block capable of being printed from the surface on the type press. That is, the lines or parts which impress the paper are to be left in relief, while the white parts are cut out so as to leave the paper unprinted. "Process" relief blocks may be divided into two kinds, those reproduced from black-and-white, or line drawings in pen and ink; and those from half-tone photographs, or wash drawings. When pen-and-ink drawings, engravings or any other drawing in line are to be produced the subject is photographed to the required size. This process allows the drawing to be made of any convenient size, while a drawing on transfer paper must be of the exact size required. There are also several gelatine processes, all of which are based on practically the same principle. The production of relief blocks from ordinary photographs or drawings made by washes of black and white baffled all efforts till the invention of Meisenbach's process. In relief block every part which touches the paper prints black, and every part which does not touch the paper leaves it white. Some method had to be devised of turning the smoothly graded tones of a photograph into pure black and white. The method sought after was to break up the photo-tones into a grain, stipple or line, which should be closest in the darkest parts, and become more open as the lights were approached. That patented by Meisenbach of Munich in 1882 as the one on which nearly all the most successful subsequent processes are based, may be briefly explained. A glass plate is prepared with fine parallel lines. This is exposed between the lens and the sensitive plate in the camera, at a very short distance from the plate, and when the exposure is half completed the cap is put on the lens, the lined plate is taken out and put in with the lines in the reverse direction, and the exposure is completed. The resultant negative is thus broken into minute regular dots. In a successful process invented by Mr. Ives, of Philadelphia, and patented in 1884, a swelled gelatine relief is taken of the subject, and on a plaster cast of this a stipple is impressed by means of an elastic stamp, which gives the operator greater control over the effect. He is then able to ink the plaster cast and transfer an impression of it to a sheet of india-rubber, and from that to a plate of zinc. A "grained" photograph being finally obtained by means of any of the thousand and one processes, it is transferred to zinc and etched. Besides these photo-chemical processes there are various mechanical methods of producing relief blocks. Some of them are very technical. Dawson's typo-etching process, an improvement on Palmer's glyphographic process (patented in 1848) is very extensively used for the production of maps, plans, diagrams, etc. This process is carried to great perfection in the United

States, where most beautiful maps are produced by it.

These processes, though simple enough in theory, give great scope for skill in manipulation and much of their success depends on the ability of the operator. The rapidity with which they can be produced has rendered the daily illustrated paper a possible and accomplished fact. As to cost, blocks can be produced for from 8 to 30 cents a square inch of surface, according to the nature of the drawings — the stipple process being the more expensive. In France, Germany, and the United States the processes have been much more employed as a means of book illustration than in Great Britain, though even there every year shows rapid advance in their use. As to the comparative merits of wood-engraving and the processes, opinions differ greatly. Generally, it may be said that the processes are more suited for subjects on a large than on a small scale, unless they are very slight, in which case they can never pretend to be more than sketches. In wood-engraving the photograph can be transferred direct to the wood and engraved without further expense for drawing, and the result, both artistically and from a printing point of view, is much more satisfactory. Though within its limits the process makes good work and the future is before it, the fact remains that as yet for finished picture work, good wood-engraving has not been superseded. HALSEY C. IVES.

Illyria, Illyris, or **Illyricum,** a name anciently applied to all the countries on the East coast of the Adriatic. In the 4th century B. C., the N. portions of Illyria were visited by the Gauls, who expelled the natives, and drove them to the S. Philip II., King of Macedon, waged war with the Illyrians 359 B. C.; and the Romans sent an army against them, and compelled them to sue for peace, 232 B. C. The second Illyrian war commenced 229 B. C., and also terminated in favor of the Romans. The Dalmatæ revolted from the Illyrians 180 B. C., and formed the independent State of Dalmatia, and the remaining country was reduced into a Roman province by L. Anicius 168 B. C. It became an imperial province 11 B. C. Dalmatia, Carniola, and some neighboring countries, received the name of Illyrian Provinces by a decree issued by Napoleon I., Oct. 14, 1809. In 1815, these provinces were united as a kingdom to the Austrian empire, and some alterations were made in its boundaries, especially by the restoration to Hungary of what had formerly belonged to it, and the annexation of the whole of Carinthia instead. The kingdom was divided into the two governments of Laibach and Trieste, Laibach being the capital; which arrangement existed till 1849, when it was subdivided, for administrative purposes, into the duchies of Carinthia and Carniola, and into the coast district, containing the territory of Trieste, and the counties of Görz, Gradiska, and Istria.

Ilmen, formerly Moysk, a lake in the Russian government of Novgorod, with an area of 354 square miles, and a depth varying from 7 to 30 feet. The rivers Shelon, Lovat, Msta, and several others flow into the lake, which discharges its waters through the river Volkhof into Lake Ladoga. The lake abounds in fish.

Iloilo (ē″lō-ē′lō), the capital of the island of Panay in the Philippine group, and second only in importance to Manila, from which it is 250 miles distant. Early in 1899 it was taken possession of by the insurgents, who drove the Spaniards out and made it the seat of the so-called government of the Visayas Federation. After the treaty of peace between Spain and the United States was ratified, Feb. 6, 1899, General Miller was instructed by General Otis to communicate with the rebel governor and make conditions of surrender. This was done Feb. 11, and the insurgents were given till the evening of that day to evacuate the city under penalty of bombardment and assault. Their only reply was to fire upon the gunboat "Petrel," conveying General Miller. The "Petrel" and her consort, the "Baltimore," then bombarded the town and in a few hours the insurgents set fire to the place and fled. The American troops soon extinguished the fire and hoisted the stars and stripes. Iloilo has a fine harbor, and a better climate than Manila, and is surrounded by extensive sugar plantations. Pop. (1903), province, 410,315; city, 19,054.

Ilori (il′or-ē), or **Illorin,** capital of a Yoruba State in Western Africa, and a great commercial center, stands, at an elevation of 1,300 feet, about 160 miles W. from Lagos (on the coast). The people, 70,000 in number, consist of Yorubas, Haussa, Fulah, and others, and make cloth, arms, and leather. The State is now practically a province of Sokoto; and is within the territory of the British Royal Niger Company. The religion is Mohammedanism, with strong traces of heathenism. See NIGERIA.

Ilus (il′us or ī′lus), a King of Troy; son of Tros by Callirhoe. He extended and embellished his city, called Ilium, and also Troy, after his father Tros. Jupiter gave him the Palladium, a celebrated statue of Minerva, and promised that so long as it remained in Troy, the city would remain impregnable. When the temple of Minerva was in flames, Ilus rushed into the middle of the fire to save the Palladium. For this action he was deprived of his sight by the

goddess; but subsequently recovered it. He is said to have reigned between 1402 and 1347 B. C.

Imabenzile (im-ä-ben'zil), in chemistry, $C_{14}H_{11}NO$, a white, crystalline; inodorous powder, obtained, together with benzilam and benzilimide, by the action of dry ammoniacal gas on benzile dissolved in hot absolute alcohol, thus: $C_{14}H_{10}O_2 + NH_3 = C_{14}H_{11}NO + H_2O$. It is insoluble in water, in boiling alcohol, and in ether, but dissolves readily in an alcoholic solution of potash. The crystals melt at 140°, but on cooling they solidify without recrystallizing.

Image, in rhetoric, a term used to denote a metaphor expanded and made a more complete picture by the assemblage of various ideas through which the same metaphor continues to run, yet not sufficiently expanded to form an allegory. In optics, the representation of an object formed at the focus of a lens or mirror by rays of light refracted or reflected to it from all parts of the object. The figure of the object is reversed in the image. The latter may be made to fall upon a screen, a photographic plate, or on the retina of the eye. It may also be viewed directly in a microscope or a telescope. Accidental images are those produced when a colored object, having been placed upon a black ground, the eye, after having been fixed upon it, is turned to a white sheet. The image is of a complementary color.

Image Worship, the adoration in public or private of graven or painted representations of sacred persons or things. Neither in the New Testament nor in any genuine writings of the first age of Christianity can any trace be discovered of the use of statues or pictures in the worship of Christians, whether public or private. The earliest allusion to such representations is found in Tertullian, who appeals to the image of the Good Shepherd as engraved upon the chalices. A very curious pagan caricature of Christianity of the same age, has, however, been discovered scratched upon the wall of a room in the palace of the Cæsars. It represents a man standing in the attitude of prayer, with outstretched hand, before a grotesque caricature of the crucifixion, which bears the title "Alexamenus worships God." The tombs of the Christians in the Roman catacombs, many of which are of a date anterior to Constantine, frequently have graven upon them representations of the Dove, of the Cross, of the symbolical Fish, of the Ship, of Adam and Eve, of Moses striking the rock, of Jonah, of Daniel in the lions' den, of the apostles Peter and Paul, and above all, of the Good Shepherd; and those compartments of the catacombs which were used as chapels are often profusely decorated with sacred representations, the age of which, however, it is not easy to determine with accuracy. It is admitted that, from the fear of perpetuating idolatrous notions, for the first three centuries the use of images was rare and exceptional; nor was it till after the establishment of Christianity under Constantine, and particularly after the condemnation of the Nestorian heresy in 430, that statues and pictures of the Saviour, of the Virgin Mary, and the Saints, were commonly introduced in churches, especially in the East and in Italy. And yet even in the 5th century the practice had already reached a great height, as we learn from the Church historian, Theodoret, for the East, and from Paulinus of Nola, for Italy; and in the 6th and 7th centuries many popular practices prevailed which called forth the condemnation of learned and pious bishops both in the East and in the West. It was usual not only to keep lights and burn incense before the images, to kiss them reverently, and to kneel down and pray before them, but some went so far as to make the images serve as godfathers, and godmothers in baptism, and even to mingle the dust or the coloring matter scraped from the images with the eucharistic elements in the Holy Communion. This use of images by Christians was alleged as an obstacle to the conversion of the Jews, and as one of the causes of the progress of Mohammedanism; and the excesses described above provoked the reaction of Iconoclasm. See ICONOCLAST. In the second Council of Nice (787) the doctrine as to the worship of images was carefully laid down. A distinction was drawn between the supreme worship of adoration, which is called *latreia,* and the inferior worship of honor or reverence, called *douleia.* The second Council of Nice declared that the worship to be paid to images is not the supreme worship of *latreia,* but only the inferior worship of *douleia;* and also that it is not absolute, and is not rendered to the images themselves, but relative — *i. e.,* only addressed through them, or by occasion of them, to the original which they represent. A strange error in the translation of the Greek acts of the Council of Nice, by which it appeared that the same adoration was decreed by that council to images "which is rendered to the Holy Trinity itself," led to a vehement agitation in France and Germany under Charlemagne, and to a condemnation by a synod at Frankfort of the doctrines of the Council of Nice. But an explanation of this error, and of the false translation on which it was based, was immediately afterward given by the Pope; and eventually the Nicene exposition of the doctrine was universally accepted in the Western as well as in the Eastern Church.

At the Reformation the reforming party generally rejected the use of images as an unscriptural novelty, and stigmatized the Roman Catholic practice as superstitious and even idolatrous. The Zwinglian, and subsequently the Calvanistic Churches entirely repudiated all use of images for the purposes of worship. Luther, on the contrary, while he condemned the worship of images, regarded the simple use of them even in the church for the purpose of instruction and as incentives to faith and to devotion as one of those *adiaphora*, or indifferent things, which may be permitted, though not of necessary institution; hence, in the Lutheran churches of Germany and the Northern kingdoms, pictures, crucifixes, and other religious symbols are still freely retained. In the modern Anglican Church the practice is still a subject of controversy, and the magnificent sculptured reredos erected in St. Paul's Cathedral was protested against as idolatrous by some of the London clergy in 1888. In the Presbyterian Church and in all the other Protestant communions images are entirely unknown, though figures of patron saints and eminent Churchmen have occasionally been set up.

The Roman Catholic Church, through the decree of the Council of Trent, disclaims the imputation commonly made against Roman Catholics of the idolatrous worship of images, "as though a divinity dwelt in them, or as though we (Roman Catholics) asked anything of them, or trusted in them, as the heathens did in their idols." It renews the Nicene distinction between absolute and relative worship; the latter of which alone —"whereby we worship Christ and the saints, who are the prototypes of these images"— it sanctions or permits; and it contends for the great advantage, especially in the case of rude and unlearned people, to be drawn from the use of pictures and statues in the churches as "memorials of the sufferings and of the mercy of our Lord, as instructive records of the virtues of the saints, and exhortations to the imitation of their example, and as incentives to the love of God and to the practice of piety." In many foreign churches, especially in Italy, in Southern Germany, and in France, are to be found images which are popularly reputed as especially sacred, and to which, or to prayers offered before which, miraculous effects are ascribed. Most Roman Catholic books of instruction contain cautions against attributing such effects to any special virtue of the images themselves, rather than to the special faith, trustfulness, and fervor which are stirred up by their presence, and by the recorded examples of the mercy of God with which they are associated in the minds of the faithful.

Imaginary Expression, or **Quantity,** an algebraic expression or symbol having no assignable arithmetical or numerical meaning or interpretation; the even root of a negative quantity. Such expressions are called imaginary, because, while the rule of signs holds good, it is impossible to conceive of quantities which they represent Also called an impossible expression or quantity.

Imagination, a term used in various significations. According to Reid, imagination, in its proper sense, signifies a lively conception of objects of sight, being distinguished from conception as a part from a whole; and Addison says that "the pleasures of imagination are such as arise from visible objects, since it is the sense of sight that furnishes the imagination with its ideas." Others, however, employ the word in a much wider signification: some, as synonymous with fancy; others, as denoting generally that faculty of the human mind by which thoughts or ideas are produced at will. Philosophers have divided imagination into two kinds — the reproductive and the productive. By the former, they mean imagination considered simply as reëxhibiting or representing the objects presented by perception, that is, exhibiting them without addition or retrenchment, or any change in the relations which they reciprocally held when first made known to us through sense. The productive or creative imagination is that which is usually signified by the term imagination or fancy in ordinary language. According to Hamilton, "imagination, in the common acceptation of the term, is not a simple, but a compound faculty — a faculty, however, in which representation — the vivid exhibition of an object — forms the principal constituent. The reproductive imagination is not a simple faculty; it comprises two processes: first, an act of representation, strictly so called, and secondly, an act of reproduction arbitrarily limited by certain contingent circumstances; and it is from the arbitrary limitation of this second constituent that the faculty obtains the only title it can exhibit to an independent existence." In like manner, "the imagination of common language — the productive imagination of philosophers — is nothing but the representative process plus the process; to which I would give the name of the comparative." The imagination represents ideas in three principal orders: 1. The natural order, that in which we receive the impressions of external objects, or the order according to which our thoughts spontaneously group themselves. 2. The logical order, presenting what is universal prior to what is contained under it as particular, or presenting the particular first, and then ascending to the universal which they constitute. 3. The poetical, which consists in seizing individual circumstances, and grouping them in such a man-

ner that the imagination shall represent them so as they might be offered by the sense. There are different kinds of imagination, as there are different kinds of intellectual activity. There is the imagination of abstraction, the imagination of wit, the imagination of judgment, the imagination of reason, the imagination of feeling, and the imagination of the passions.

Imaus (i-mā′us), a name applied by the ancients sometimes to the Hindu Kush and the W. part of the Himalayan range, and sometimes in a vague way to a range in Central Asia (supposed to be the Altaian Mountains), which they believed to divide the vast region to which they gave the name of Scythia, into two parts.

Imbecility, the quality or state of being imbecile; weakness, mentally or physically. An imbecile person often changes his views and vacillates in his purposes. A stupid person is very persistent in his opinions and resolves, both of which, however, are senseless. That which in its highest form is genius, in its lowest is imbecility; that which in its highest form is talent, in its lowest is stupidity.

Imbert, Barthelémi (*ang*-bār′), a French poet; born in Nîmes, in 1747. He attained celebrity with "The Judgment of Paris," a specimen of delicately wrought and musical versification. He also wrote a "Book of Fables." He died Aug. 23, 1790.

Imbert de Saint-Amand, Arthur (*ang*-bār′ duh s*ang*t-ä-mä*ng*), a French biographer and historian; born in Paris, Nov. 22, 1834. His career was a diplomatic and official one till he began a study of the lives of the women of the old French courts, of the First Empire, and of the Restoration. His "Women of Versailles" is a graphic presentation of court manners and morals under the last three of the Louises before the Revolution, while the "Women of the Tuileries" is a bit of realism in biography that brings the era vividly before the reader. His studies of the Napoleonic royalties sustain the reputation established by the earlier works.

Imbriani, Vittorio (ēm-brē-än′ē), an Italian poet; born in Naples, Oct. 27, 1840. His life was involved in political turmoil, but he made himself known as a graceful and elegant poet with "Popular Songs of the Southern Provinces," and as an ode writer of strength and dignity in an "Address to Italy's Queen." In prose he ranks high, as "Purloined (or Usurped) Reputations," a book of literary essays, demonstrates. His "Philological Studies in Dante" is a valuable contribution to our knowledge of the great Florentine. He died in Naples, Jan. 1, 1886.

Imbros, an island of the Ægean Sea; about 14 miles N. E. of Lemnos and the same distance W. of the mouth of the Dardanelles; area 98 square miles. The island is mountainous, its highest summit attaining 1,959 feet above sea-level. Goats and bees are kept. The inhabitants cultivate the soil and carry on fishing. The chief village, Kastro, is on the N. coast, and occupies the site of the ancient town of Imbros. It is the seat of a metropolitan of the Greek Church.

Imeritia, a former province of Russia, now included in Kutais. It stretches along the S. limit of Caucasus, having the Black Sea on the W., and Georgia on the E. In the 14th century, this province formed a part of the kingdom of Georgia, but afterward became independent, and was governed by its own sovereigns, one of whom, in 1804, voluntarily made it over to Russia.

Imitatio Christi, a famous book highly prized by devout Christians of all confessions, and translated into more languages than any book except the Bible. The question of its authorship has given rise to a great controversy. It was formerly attributed unhesitatingly to Thomas à Kempis, and the best authorities still regard it as his work. But it has been claimed for Chancellor Gerson, for Gerson, abbot of Vercelli (an apparently hypothetical person), for Walter Hilton, a monk of Sheen in Surrey, for Bonaventura, Bernard of Clairvaux, and for many other writers, both famous and obscure.

Imitation, in music, the repetition of a short subject by another part. The subject proposed is sometimes called the antecedent, and the passage which afterward imitates it the consequent. Imitation by diminution is when the consequent is in notes half the length of those of the antecedent. Imitation by inversion is when the intervals of the antecedent are inverted in order to form the consequent. Imitation is said to be convertible when antecedent and consequent are interchangeable. If strict imitation be continued for any length of time, it is said to be canonical.

Imitative Suggestion. See SUGGESTION.

Imlah, John, a Scottish poet and songwriter; born in Aberdeen, in 1799. His songs met the popular fancy, and are to be found in all Scotch collections. He published "May Flowers" in 1827, followed by "Poems and Songs" (1841). He died in St. James, Jamaica, in 1846.

Immaculate Conception, a name applied to the dogma defined by Pope Pius IX., on Dec. 8, 1854, that the immaculate conception of Mary is an article of divine faith. According to the dogma, in her active conception, or generation, there was nothing miraculous; but in the passive conception, or infusion of a rational soul, she

was sanctified and preserved from the taint of original sin by the foreseen merits of Christ. The traditional day of Mary's conception has been honored with a feast from the 12th century, and found a place in the calendar in the 14th century. In the 15th century, all doctors of Paris were bound to defend the doctrine, which was warmly adopted by the Franciscans and Carmelites, while the Dominicans, naturally following Thomas of Aquin, held the contrary view. The Council of Trent expressly excepted Mary from the decree "On Original Sin," adopted in the fifth session (June 17, 1546).

Immanence, the notion that the intelligent and creative principle of the universe pervades the universe itself, a fundamental conception of Pantheism.

Immanuel (im-man'ū-el), the name which was to be given to a child who, it was prophesied by Isaiah, was to be born of *haalmah, i. e.,* the virgin. At the time the words were uttered, the kingdom of Judah was threatened with political extinction by a hostile confederacy, consisting of the kingdoms of Israel and Syria. For the encouragement of King Ahaz it was stated that before the child Immanuel should be old enough to discern between good and evil, "the land," as it has been rendered, "shall be forsaken, of whose two kings thou art afraid" (Isa. vii: 10–16). In Matt. i: 23 the prophecy is applied to the miraculous birth of Jesus from the Virgin Mary.

Immaterialism, a term sometimes so widely taken as to be a synonym for Idealism or Phenomenalism; more usually limited to the doctrine of George Berkeley, Bishop of Coyne (1684–1753). Prof. A. C. Fraser reduces this system to three principles: (1) The negation of matter, as signifying an unperceived substance proper, of the Ego; and, as cause proper, of a reasonable will; (3) The affirmation of matter, as consisting of the ideas, objects, or perceptions of sense; of material substances usually called sensible things; and of material causes or uniform antecedents in the order of sensible changes.

Immermann, Karl Leberecht, a German dramatic poet and writer of romance; born in Magdeburg April 24, 1796; studied at the gymnasium there and went to the University of Halle to study law, but quitted it in 1813 to carry arms in defense of his country. He afterward returned to Halle, where he completed his studies, and shortly after obtained appointments under government, first as referendary in Magdeburg, then in 1819 as auditor in Münster, and in 1827 as rural judge in Düsseldorf. Here, it is said from disinterested motives, he undertook the management of the theater which he hoped to make a model establishment for Germany. He did not prove successful and was obliged to abandon the attempt after having suffered considerable loss. While employed with the compilation of his "Memorabilien" (1840), he was seized with apoplexy, and suddenly died, Aug. 25, 1840. At the commencement and toward the middle of his literary career he acquired considerable reputation, particularly by his dramatic poems. In his tragedies he made Shakespeare his model, and imitated him with considerable success. His romance entitled "Epigonen" (1836) possesses great merit, but in some parts is too close an imitation of Goethe's "Wilhelm Meister." He displayed greater originality and obtained still greater popularity by his "Münchhausen" (1838–1839) abounding in excellent descriptions of village life.

Immigration, the entrance into a country of aliens with a view to settlement. The voluntary immigration of aliens into the United States has been a potent factor in the creation of the country's greatness. In the early years it brought the best of every country; the men with courage and enterprise enough to risk all the dangers and hardships of emigration in order to improve their own condition and that of their children after them. But much of the recent immigration has been of a different sort. For a time European governments by "assisting" emigrants poured in upon America paupers, cripples, insane persons, and incorrigible criminals. This was prevented or very greatly checked some years ago. Then came "head money" immigration — that is to say, immigration induced by the agents of steamship and railroad companies, whose sole concern was to secure passage money, as they might seek cattle shipments for freight money. It was an evil so pronounced that Congress passed a general law in 1897 dealing with the entire subject of immigration. Supplementary bills were enacted into law subsequently.

The United States statutes now exclude illiterates — persons who cannot read and write in some language — and it provides simple but adequate tests of illiteracy. Since the assassination of President McKinley in 1901, there has been strenuous advocacy of an immigration law designed to exclude anarchists; and at the opening of Congress, Dec. 2, 1901, several anti-anarchist bills were introduced.

IMMIGRATION INTO THE UNITED STATES, 1820–1900.

Year.	Total Alien Passengers.	Year.	Total Alien Passengers.
1820	8,385	1826	10,837
1821	9,127	1827	18,875
1822	6,911	1828	27,382
1823	6,354	1829	22,520
1824	7,912	1830	23,322
1825	10,199	1831	22,633

Year.	Total Alien Passengers.
1832	60,482
1833	58,640
1834	65,365
1835	45,374
1836	76,242
1837	79,340
1838	38,914
1839	68,069
1840	84,066
1841	80,289
1842	104,565
1843	52,496
1844	78,615
1845	114,371
1846	154,416
1847	234,968
1848	226,527
1849	297,024
1850	369,986
1851	379,466
1852	371,603
1853	368,645
1854	427,833
1855	200,877
1856	246,945
1857	246,945
1858	119,501
1859	118,616
1860	150,237
1861	89,724
1862	89,207
1863	174,524
1864	193,195
1865	247,453
1866	163,594
Fiscal yr. end'g June 30 1867	298,967
1868	282,189
1869	352,569
1870	387,203
1871	321,350
1872	404,806
1873	459,803
1874	313,339
1875	227,498
1876	169,986
1877	141,857
1878	138,469
1879	177,826
1880	457,257
1881	669,431
1882	788,992
1883	603,322
1884	518,592
1885	395,346
1886	334,203
1887	490,109
1888	546,889
1889	444,427
1890	455,302
1891	560,319
1892	623,084
1893	502,917
1894	314,467
1895	279,948
1896	343,267
1897	230,832
1898	229,299
1899	311,715
1900	448,572
Total	19,765,155
1789 to 1820 est	250,000

The number of aliens who arrived in the United States in the period of June 30, 1901-June 30, 1910, was 9,771,512, making the total number of arrivals in 1820-1910, 29,043,589, and the total since 1789, 29,293,589. In the 1901-1910 period each alien had an average of $22 in money. The Southern Italians led all in numbers, with a total of 1,761,948; Jews came second, with 976,263; Polish homeseekers were third, with 873,660; and the Pacific islanders were the least in number, only 661. Spanish-Americans averaged $104 in money; Jews $13.

Immolation, a ceremony used among the ancient Romans with regard to their sacrifices. It consisted in throwing frankincense, wine, and a species of cake, on the head of the victim, before it was sacrificed; consequently, when immolation was performed, the victim was already doomed, and the term became applied to the sacrifice itself.

Immortality, exemption from death; the state of everlasting life. The dogma of the immortality of the soul is very ancient. It is connected with almost all religions, though under an infinite variety of conceptions. By the immortality of the soul we understand the endless continuation of our personality, our consciousness, and will. There are so many reasons to render immortality probable that with most nations the belief is as clear and firm as the belief in a god; in fact the two dogmas are intimately connected in the minds of most men. The hope of immortality must be considered a religious conviction. Reason and religion command man to strive for continued perfection. This duty man cannot relinquish without abandoning at the same time his whole dignity as a reasonable being and a free agent. He must, therefore, expect that a continuation of his better part as the necessary condition for his progress in perfection, will not be denied to him. Hence the belief in immortality becomes intimately connected with our belief in the existence and goodness of God. Among rude peoples the life after death is usually regarded as a state of being not essentially different from the present — one in which the hunter shall renew his chase, and his corporeal senses shall have their accustomed gratifications. Among the ancient Greeks and Romans the spirits of the dead were believed to live in the other world as a sort of shadows, and the life after death was also considered as a shadow of the present. Among some peoples the imagination attributes changes of condition to the future life, and the doctrine of transmigration, or the progress of the mind or soul in different stages, is developed. Connected with the belief in the immortality of the soul is the belief in a state where souls are purified after death, as existing among the Egyptians and many Christians.

Immortelles, a name for flowers, also known as everlasting flowers, and often made into wreaths for adorning graves.

Immune, safe from an attack; protected, as from a specific virus or disease, by vaccination, inoculation, or antitoxin treatment, or by previous illness. A person who has been rendered exempt from a specific disease by reason of once having had it; one who is safe from an attack of any special disease. During the American-Spanish War 10 regiments of yellow fever immunes were recruited for service in Cuba.

Impalement, in heraldry, the arranging of two coats of arms on one shield, divided palewise, or by a vertical line. Thus the arms of husband and wife are impaled, the husband's being borne on the dexter side of the pale, and the wife's on the sinister. Bishops, deans, heads of colleges, etc., impale their own arms with those of their office.

Impanation, a technical word formed on the analogy of "incarnation," employed in eucharistic controversies as early as the 12th century to express the union of the body of Christ with the consecrated bread in the eucharist; but later specially used of Luther's doctrine of consubstantiation.

Impasto, in painting, a term used to express the thickness of the layer or body

of pigment applied by the painter to his canvas. According to the method of handling exercised by different artists, this impasto is thick or thin. Rembrandt, Salvator Rosa, and others used a thick impasto; Raphael, Guido, and others, an impasto so thin that threads of the canvas and the crayon outline may be seen through it.

Impatiens, a genus of *Balsaminaceæ*, with the calyx and corolla so abnormal that it is difficult to discriminate the several parts; sepals three, rarely five, petaloid, imbricate, two anterior (if present) minute, two lateral small and flat, the posterior one large, produced into a hollow spur; petals three, anterior external, in bud large, lateral, two-lobed; stamens five; ovary oblong, fixe-celled; stigma sessile, five-toothed. About 135 species are known, nearly all from the Himalayas and other Indian mountains. The distilled water of the yellow balsam, taken in large quantities, is said to bring on diabetes.

Impeachment, the act of accusing, or charging with a crime or misdemeanor; the arraignment of a minister of state for maladministration or treason. In England impeachments are made in the House of Commons, and tried by the House of Lords.

The Constitution of the United States provides that the House of Representatives shall have the sole power of impeachment; and that the Senate shall have the sole power to try all impeachments. Section 4 of Article II. provides that the President and Vice-President and all civil officers of the United States shall be removed from office on impeachment for and conviction of treason, bribery, or other high crimes or misdemeanors. The removal of Federal officers by impeachment proceedings under Section 4 of Article II. of the Constitution has been attempted seven times.

The Blount case was the first. William Blount, United States Senator from Tennessee, was charged in 1797 with conspiring with British officers to steal part of Louisiana from Spain for England's benefit. The House prepared articles of impeachment. The Senate expelled him, after putting him under bonds for trial. Blount's defense was that a Senator was not a civil officer liable to impeachment, and on the question of jurisdiction only he was acquitted.

Judge John Pickering, of the Federal District Court for New Hampshire, was impeached in 1803 for drunkenness and profanity on the bench. The defense was insanity. On trial before the Senate, Pickering was convicted by a party vote, and removed from his office.

In 1804, Samuel Chase of Maryland, a justice of the Supreme Court of the United States and one of the signers of the Declaration of Independence, was charged with improper conduct on the bench; among other things, with having indulged in "highly indecent and extra-judicial reflections upon the United States Government" in the course of a charge to a Maryland grand jury. The impeachment proceedings, instigated and managed by John Randolph of Virginia, were political in their origin and animus. Judge Chase was acquitted through the failure of the prosecution to obtain a two-thirds vote against him in the Senate, on any one of the eight articles of impeachment. He resumed his seat on the bench, and held it as long as he lived.

About a quarter of a century later, James H. Peck, a Federal district judge in Missouri, was impeached for oppressive treatment of an attorney. The case was of no importance; the judge was acquitted.

Thirty years afterward, at the beginning of the Civil War, Judge West H. Humphreys of the Federal District Court of Tennessee, joined the Confederacy and accepted judicial office under it, without taking the trouble to send his resignation to Washington. He was impeached, mainly in order to vacate the office, and convicted on June 26, 1862. One of the witnesses summoned to appear against Judge Humphreys was Andrew Johnson, then governor of Tennessee, destined himself to be the next subject of impeachment proceedings before the Senate. One of the four Senators who voted not guilty on the article charging Judge Humphreys with high treason, was William Pitt Fessenden, whose vote five years later saved Andrew Johnson.

Andrew Johnson was impeached on March 4, 1868, the 11 articles charging the President in various forms with violation of the Tenure of Office act, with violation of the Constitution, with conspiracy to prevent the execution of the Tenure of Office act, with conduct and utterances tending "to bring the high office of President into contempt, ridicule, and disgrace"; and with the public declaration, in his speeches while swinging around the circle, that the Thirty-ninth Congress was no constitutional legislature. It is not necessary to recite the history of the memorable trial, which lasted for nearly three months, and in which the hottest of political passions were enlisted. Thirty-six votes were needed to convict. No vote was ever taken except on the three strongest articles, the second, third, and eleventh, and on each of these the Senate stood 35 for conviction to 19 for acquittal, impeachment failing by a single vote. One of the counsel who defended President Johnson was William M. Evarts of New York.

The seventh and last Federal impeachment was that of William W. Belknap, Grant's Secretary of War. He was justly

charged in 1876 with corruption in office, and the House voted unanimously to impeach him. He resigned hastily a few hours before the passage of the impeachment resolution, and his resignation was promptly accepted by Grant. The trial proceeded, nevertheless. Belknap's defense was a denial of jurisdiction, based on the circumstance that when the impeachment resolution passed the House, he had ceased to be a civil officer of the United States. The impeachment proceedings failed by the lack of a two-thirds majority in the Senate for conviction.

It will be observed that in only two cases have impeachment proceedings against a civil officer of the United States been prosecuted successfully before the Senate by the House of Representatives. One of these was for the removal of a drunken and profane judge, whose presence upon the bench was a public scandal. The other was a purely formal proceeding to vacate the office of a judge actually engaged in open rebellion against the government, but technically still an incumbent of his office under the government. Of the five unsuccessful impeachment proceedings on record, two failed for want of jurisdiction. Of the whole seven cases, four concerned judicial officers. Only once has there been an attempt to punish by impeachment a Cabinet officer. Only once has there been an attempt to punish and remove by impeachment a President of the United States.

Impenetrability, one of the essential properties of matter, implies that no two bodies can at the same time occupy the same space. If a nail be driven into a piece of wood, it does not, properly speaking, penetrate the wood, for the fibers are driven aside before the nail can enter. If a vessel be filled with fluid, and a solid body be then placed in it, as much water will run over as is equal in bulk to the solid body, in this way making room for it. The lightest gases are really as impenetrable as the densest solid; though, owing to their compressibility, it is not readily made apparent.

Impennes (im-pen′ēz), the name given by Illiger to a family or tribe of swimming birds having short wings covered with scale-like feathers. It includes the divers, the auks, the penguins, etc.

Imperator (im-per-ā′tor), a title originally bestowed upon a victorious leader on the field of battle by his soldiers; toward the end of the commonwealth it was conferred by the Senate. It might be conferred more than once on the same person. Augustus and his successors constantly assumed this title, and it became the peculiar appellation of supreme power. Still later it became equivalent to the modern emperor. In zoölogy, a genus of gasteropodous mollusks, family *Turbinidæ*. About 20 species are known from South Africa, India, Australia, and New Zealand.

Imperatorin (im-per-ä-tor′in), $C_{12}H_{12}O_3$, peucedanin, a neutral substance destitute of taste and smell, obtained from the root of the masterwort by digesting it in boiling alcohol and purifying, by means of ether, from a brown resinous body with which it is contaminated. It crystallizes in tufts of colorless, transparent prisms, which melt at 75° without loss of weight. It is insoluble in water, partly soluble in boiling alcohol, but very soluble in ether. The alcoholic solution of imperatorin has a burning aromatic taste, and produces a sensation of scratching in the throat.

Imperial, pertaining to an emperor or empire; thus, an imperial crown is such as is worn by the German emperor; the Imperial Parliament is that of the United Kingdom. A size of paper, measuring 30 inches by 22, is also called imperial.

Imperial City, a designation of Rome, for ages the mistress of the world.

Imperial Federation, a term in English politics for the consolidation of the British empire, so as to combine its resources for the maintenance and defense of common interests, while leaving intact the existing rights of colonial parliaments in local affairs.

The celebration of the 60th year of Victoria's reign in 1897 was the occasion of a gathering in London of the prime ministers of all the self-governing colonies, who were entertained as the guests of the country. This was the second occasion of a meeting of representatives of the colonies in London, the first having been the conference of 1887. After taking part in the queen's procession and the attendant festivities, the premiers met the Secretary of State for the Colonies (Chamberlain) in conference. The subject of imperial federation was discussed at one of these meetings; and though more than one of the premiers directly advocated the representation of the colonies in a council sitting in London, the opinion of the greater number was expressed in the observation that the colonies were very well as they were at present. The importance to the colonies of maritime defense was recognized by Cape Colony in the offer to the British government of an ironclad as a contribution to the navy. It has since been proposed to convert this offer into an annual contribution of money. The Canadian Tariff Act came into force in 1898, setting up a preferential tariff in favor of Great Britain and various colonies. Penny postage between Great Britain and Canada and Cape Colony was also established in 1898. A movement

was set on foot in Canada with the object of securing the enrollment of Canadians in the Royal Naval Reserve, the proposal being that they should be trained at the expense of the Canadian government, but paid by the British taxpayer.

Imperial Guard, the name given to the consular guard when Napoleon I. became Emperor of France in 1804. It was disbanded in 1815, but revived on May 4, 1854, and took part in the Crimean War in 1855. In 1870 it surrendered at Metz to the Germans, and was soon after abolished.

Imperial Institute. The Imperial Institute of the United Kingdom, the Colonies, and India, designed to commemorate the jubilee of Queen Victoria (1887), aims at comprising complete collections of the products of the various parts of the British empire, a commercial intelligence department for the promotion of trade and industry, and a great school of modern Oriental languages (opened in 1890).

Imperialism, in its original, and, perhaps, its widest sense, was expressed in the great designs of Charlemagne. Regarded thus, it amounts to a scheme of undisputed sway over an extensive area of unbroken territory — autocracy on a grand scale. In that sense we find imperialism in the traditional policy of the czars of Russia — a policy which is supposed to imply continuous expansion to the E. But imperialism, as it came to be known in connection with Germany, does not imply conquest or aggression or annexation of territory. In Germany the policy sprang from the Franco-German War, or rather from the events preceding it, and it meant simply the union, or reunion, of the several German States and peoples under one head for purposes of offense and defense, and for certain fiscal and political purposes. In connection with the British empire, the word imperialism may, however, be used as combining the interests of all the members of the group — the mother-country, the colonies and dependencies — as distinguished from purely national, colonial, or local concerns.

In the United States "imperialism" is used to refer to the policy of "national expansion." The opponents of expansion made the constitutional right of the United States to establish a government over territory acquired by conquest or purchase, a question in the political campaign of 1900; the Democrats holding such government unconstitutional; Republicans affirming that the responsibility resultant from the defeat of Spain, and the ensuing failure of Spanish government, must be met, and a stable government established. On Dec. 2, 1901, the Supreme Court of the United States handed down a decision on the constitutionality of the policy of expansion. The broad principles settled by the decision are succinctly stated to be these: (1) The Constitution does not follow the flag till it is planted on new territory by special act of Congress. (2) The extension of the sovereignty of the United States to new territory carries with it all the constitutional guarantees of the enjoyment of liberty, the right to property and the protection of the United States to the people thus affected in securing justice and maintaining public order and promoting peaceful progress. (3) The islands acquired from Spain by the treaty of Paris are "property of the United States" in the strict sense in which that term is used in the Constitution, and, this being the case, Congress can dispose of these islands in any way which it may believe to be conducive to the highest interests of the people of the United States and of these islands.

A corollary of these propositions finds expression in the statement that the United States is a trinity in point of territory, which may be described under three heads, as follows: (1) The States. (2) Incorporated territories. (3) Unincorporated territory, or territory belonging to or appurtenant to the United States.

Logically this gives to the nation three different classes of people dependent upon it for protection, to-wit: (1) Citizens vested with full and sovereign political power, or the residents of the States. (2) Citizens of the incorporated territories, who are not vested with full and sovereign political power as long as they are residents of the incorporated territories, in that they cannot vote for presidential electors. (3) The people of the "territory appurtenant to the United States," as such, who cannot become citizens of the United States till Congress extends to the territory they occupy all the provisions of the Constitution.

Impetigo, a pustular eruption, divided into "figurata" when close together, and "sparsa" when distinct. These pass into scabs of a sugar-candy color on the face, darker in other parts. Commonest in ill-fed children, or in old and debilitated persons. Good air and good food are required.

Impey, Sir Elijah, an English jurist; born in 1732. He was educated at Westminster, brought up to the bar, and sent out to Bengal as the first chief-justice appointed under the Regulating Act of 1773. From the first Impey acted in harmony with the governor-general, Warren Hastings; and in the following year presided at the trial of Maharaja Nand Kumar (Nuncomar), charged with forgery. In 1777 Impey was referred to as arbitrator between Hastings and General Clavering

when the latter claimed the reversion of the post on Hastings's alleged resignation. Impey pronounced in favor of Hastings; thereby — as the governor-general afterward acknowledged — saving his fortune, honor, and reputation. In 1779, however, a conflict occurred between the government and the court on a question of jurisdiction, which was only appeased by Impey accepting the chiefship of the company's courts in addition to his own duties. In 1783 Impey was recalled, and impeached for his conduct in the case of Nuncomar. He was honorably acquitted. He died in Newick, near Brighton, Oct. 1, 1809.

Impeyan Pheasant, in ornithology, *lophophorus impeyanus*, a fine Himalayan pheasant. The male is black, with metallic green, golden, and coppery reflections. On the head is a tuft of plumes, reflecting a golden-green hue. The tail is chestnut-red, and the rump white. The female is of more somber hues. It feeds chiefly on bulbous roots.

Imponderable Substances, a term applied to light, heat, electricity, and magnetism at a time when they were universally considered as matter, in contradistinction to those substances which possessed sensible weight.

Imports. See COMMERCE.

Impost, a tax, a toll, a tribute, a duty; a custom or duty levied upon goods imported. In architecture, the point where an arch rests on a wall or column; the upper member of a pillar, column, or entablature, upon which an arch or superstructure rests; a plat band; the upper stone of a pier or abutment, upon which the springing or bottom stone of an arch is imposed; a "continuous impost" is one in which the arch moldings are carried down the pier without interruption, and without having a capital or distinction of any kind at the spring of the arch; a "discontinuous impost," one in which the arch moldings abut and are stopped on the pier; a "shafted impost," one in which the arch moldings spring from a capital, and are different from those of the pier; and a "banded impost," one in which the pier and arch have the same moldings. The height of the impost should be from one-ninth to one-seventh of the width of the aperture, and the breadth of the archivolt not more than an eighth nor less than a tenth of it. The breadth of the under side of the keystone should be the same as the breadth of the archivolt, and its sides, of course, concentric; its length, once and a half its breadth, but not more than double its breadth.

Impressionism, the system in art or literature which, avoiding elaboration, seeks to depict scenes in nature as they are first vividly impressed on the mind of the artist or writer.

Impressment, the forcible levying of seamen for service in the navy. The practice of impressing and granting powers to the British admiralty for that purpose is of very ancient date; though no statute has expressly declared this power to be in the crown, yet many of them very strongly imply it. A statute of Richard II. speaks of mariners being arrested and retained for the king's service, as of a thing well known and practised without dispute, and provides a remedy against their running away.

Imprimatur, a license which, in countries subjected to the censorship of the press, must be granted by a public functionary appointed for the purpose before any book can be printed.

Imprisonment, the restraint of one's liberty under the custody, charge, or keeping of another. Imprisonment extends not only to a jail, but to a house, stocks, or where a man is held in the street, for in all these cases the party so restrained is said to be a prisoner so long as he has not his liberty freely to go about his business as at other times. No man can be imprisoned except by the law of the land, and no man is to be imprisoned except as the law directs, either by command and order of a court of record, or by lawful warrant.

Impropriation, in the English Church, the transfer of a benefice to the possession of a layman, the annexing of benefices to ecclesiastical corporations being called "appropriation," though they are sometimes identical. Appropriations were originally annexed to bishoprics, prebends, religious houses, etc.; but on the dissolution of the monasteries in the reign of Henry VIII. the appropriations of the several benefices belonging to them were given to the king, and were afterward granted out from time to time by the crown. It was after this time that the term impropriation was introduced to denote a benefice in the hands of a layman. The appropriator deputed some person to perform divine service in such parish, who, being merely his deputy or vicegerent, was called vicar, and his stipend was at the discretion of the appropriator. The distinction therefore of a parson and vicar is that the former is entitled to all the ecclesiastical dues of his parish, while the vicar is in effect only the curate of the real parson (the appropriator), and receives but a part of the profits.

Improving Lease, in Scotch law, a lease granted for more than the ordinary duration to a tenant with a view to encourage him to make improvements on the farm in the hope of himself benefiting by them, when, from neglect or exhaustion of the

soil, it would require great outlay and labor to prepare it for successful cultivation.

Improvisatore (im-prō-vēz-ä-tōr′ä), one who composes and recites or sings extemporaneous or impromptu verses upon any given subject without premeditation. The Italians particularly excel in this species of composition, owing, no doubt, in great measure, to the richness and flexibility of their language. The poetry, however, so produced, is of no very high character, being chiefly remarkable for its natural flow of language and quick adaptation of ideas and images to the main subject. None of the poems so produced have acquired any permanent reputation. The improvisatore generally accompanies himself on the guitar while he is giving forth his verses. Several females have likewise distinguished themselves in this art, and are styled improvvisatrici.

Imputation, a word with theological signification. The verb impute occurs 15 times in the Authorized Version; the noun imputation not at all. The Calvinistic doctrine is that Adam's sin of disobedience in Paradise is imputed to all his natural descendants, making each person who comes into the world chargeable with the guilt of Original Sin. On the other hand, God justifies those effectually called, not by counting faith itself, or any other act of obedience, as a merit, but by imputing to them as righteousness the obedience and satisfaction rendered by Christ, which they receive, and on which they rest by faith, the gift of God.

Ina, or Ine (ē′nä), a King of the West Saxons in the 7th and 8th centuries. He succeeded Ceadwalla about 689, and after having obtained advantages over the people of Kent in 694 he turned his arms against the Britons, from whom he wrested Somersetshire and other parts of the W. of England. He then made war on the Mercians; but the contest was terminated, without much advantage to either party, by a bloody battle in 715. He resigned his crown and went as a pilgrim to Rome (728), where he passed the rest of his days in devotion. He was one of the principal legislators of the Anglo-Saxons. His laws are the oldest known to us among the Anglo-Saxon kings, except those of the kings of Kent, and served as the foundation of the code formed by Alfred the Great.

Inachus (in′ä-kus), in Greek mythology, a river god. He was father of Io and hence ancestor of many ancient royal families.

Inactose (in-ak′tōs), a true sugar found in the leaves of certain plants previous to flowering. Some of the tobacco family contain as much as 12 per cent. It is less sweet than cane sugar, has a powerful reducing action on Fehling's solution, but has no action on polarized light. E. Maumené states that it may be obtained by the action of equal weights of normal sugar and silver nitrate in concentrated solution. Its characters are not well known.

Inaga Palm, a tree growing in South America, common to the countries near the Amazon; sometimes called the jagua palm. It has a tall, heavy stem, and its leaves are sometimes 50 feet long. The great woody spathes are sometimes used as cooking utensils and will not burn if filled with water. The fruit grows in clusters and has a tough skin, a soft pulp, and a hard, stony seed. The Indians eat it and monkeys and birds are fond of it.

Inanition. See STARVATION.

In Articulo Mortis (at the moment of death), a phrase relating to the execution of deeds by persons at the point of death.

Inca (in′kä), a Peruvian or rather Quichua title, signifying chief, applied to the imperial head of the Peruvian empire, and also to the governing caste or race from which he sprung, and which had a prescriptive right to the highest sacerdotal and civil dignities of the empire. The empire of the Incas, founded according to tradition, in the 11th century, by the celebrated Manco Capac, extended over the table-land of the Andes, from Pasto to the neighborhood of Chile, as well as the low lands on the coast. It was destroyed by the Spaniards under Pizarro and Almagro. The authority of the ruling Inca was absolute; his will was the supreme law. Considered as the son of the sun, and descendant in right line from Manco Capac, he was also the high priest and oracle of religion; his body after death was the object of divine honors. The blood royal of the Incas is preserved, or believed to be so, among Indians of the present day, and Tupac Amaru, who carried on a long and nearly successful insurrection against Spain in the latter part of the 18th century, professed to be descended from them.

Incandescence. See ELECTRIC LIGHTING.

Incantation, a formula, either said or sung, supposed to add force to magical ceremonies. Incantations in classic times were employed: (1) To control the powers of Nature (Hor., Ep., v: 45, 46; xvii: 4, 5, Verg., Ecl. viii: 69; Æn. iv: 489); (2) to compel the attendance and assistance of supernatural beings (Senec., Medea iv; Verg., Æn. iv: 490); (3) as love spells (Theoc., Id. ii: Verg., Ecl. viii.), in which sense they linger to the present day; and (4) as a means of inflicting injury (Hor., Ep. xvii: 27–29). Occasionally they were used in

sympathetic medicine. An interesting theory that incantations are survivals of ill remembered and mutilated formulas of the worship of Isis will be found in Pluche, "History of the Heavens" (ed. 1740, ii: 24).

In the Authorized Version incantations among the Jews are called enchantments. Those who practised them are coupled with dreamers. They were not to be hearkened to (Jer. xxvii: 9). Nor was any one of the Israelites to practise enchantments (Lev. xix: 26). Yet the Ten Tribes did so (II Kings xvii: 17).

Incarnation, the usual theological term for the union of the divine nature with the human in the divine person of Christ. The word *incarnatio* first occurs in the Latin version of Irenæus, and in the Greek fathers we find its equivalent *sarkosis* and *enanthrōpēsis.*

Incense, a perfumed vapor usually of smoky appearance. Sir G. Birdwood considers that religious censing of persons and things grew out of purificatory fumigation. Tylor is of opinion that incense is the natural outcome of animism, which might reasonably hold that offerings reduced to smoke or vapor by the medium of fire were fittingly consumed by or transmitted to spiritual beings. An inscription in the valley of Hammamat states that an Egyptian nobleman was sent by Pharaoh Sankhara 2500 B. C. "to bring back odoriferous gums" from Punt, now identified with the Somali country; the marbles of Ninevah furnish examples of offering incense to the Sun-god (II Kings xxiii: 5); and the Hindus employed it from the remotest antiquity. The progress in classic times from "fumigations with herbs and chips of fragrant wood" is shown in the *thyon* (cf. *thyos*) of Homer, and the *libarōtos* of later writers; in the *herbæ Sabinæ* and *laurus* of Ovid and the *mascula thura* of Vergil.

Jewish.— *Qetoreth, qetorah.* This is sometimes confounded with *lebonah,* frankincense, which is the name of a plant. Incense was compounded of stacte, onycha, galbanum, and pure frankincense, an equal part of each by weight. Any one making a similar composition was to be cut off from the people of God (Exod. xxx: 34–38). Incense was to be burnt every morning and evening on the "altar of incense" (Exod. xxx: 7, 8). On the great day of atonement a handful of it, put on a censer of burning coals when the priest went within the veil to the Most Holy Place, was to rise in a cloud covering the mercy seat (Lev. xvi: 12, 13). It was used also on extraordinary occasions, at times of great public calamity, as plague (Num. xvi: 46–50). Only the priests might burn incense (II Chron. xxvi: 16–21; Luke i: 8, 9). Probably it symbolized the acceptable prayers of saints (Psalm cxli: 2; Rev. viii: 4).

Christian.— In the Roman and Greek Churches it is used in all the solemn offices. It is mentioned in the first *Ordo Romanus,* probably of the 7th century. It is also used in the Catholic and Apostolic Church. In the Anglican Church the use of incense was gradually abandoned after the reign of Edward VI. till the ritualistic revival of the present day; but it has never been formally prohibited. Neither the Reformed Churches of Europe nor English Protestant dissenters employ incense in their ritual.

Incest, the crime of sexual intercourse between persons related within the degrees wherein marriage is forbidden by the law of the country. Spiritual incest is a term denoting the crime of sexual intercourse between persons spiritually allied by baptism or confirmation. Also the act of a vicar or other beneficiary who holds two benefices, the one depending on the collation of the other.

Inch, a lineal measure, being the 12th part of a lineal foot, or the 36th part of a lineal yard. It is subdivided into halves, quarters, eighths, sixteenths, etc., for mechanical purposes, and also for scientific purposes decimally, and into lines, each line being the 12th part of an inch. It was further also divided into three parts, called barley corns.

Inch, an island. It appears frequently as an element in the names of small islands belonging to Scotland; as, Inchcolm, etc. In Ireland it appears in the original form of Innis or Ennis.

Inchbald, Elizabeth (Simpson), an English novelist and dramatic author; born in 1753. She early became the wife of Inchbald, a London actor, by whom she was brought on the stage. After 1784 she wrote plays, several of which were very successful; her comedy of "Wives as they Were and Maids as they Are," is still acted. She edited three collections of plays. Her best literary works are her two novels—"A Simple Story" (1791); and "Nature and Art" (1796). She died in 1821.

Inch Cape. See Bell Rock.

Inchcolm (insh-kōm′), a small island of Scotland, in the Firth of Forth, off the coast of Fifeshire, with the ruins of a monastery founded by Alexander I. in 1123, of which Walter Bower, the continuator of Fordun, was abbot from 1418 till 1449.

Inchkeith (insh-kēth′), a small island of Scotland, in the Firth of Forth, off the Fifeshire coast, containing a lighthouse.

Incidence, the manner of falling on, or the direction in which a body, or a ray of light, heat, etc., falls upon any surface. **Angle of incidence,** an angle formed by

two straight lines, one the line of incidence of a ray of light or heat, or of an elastic body moving to strike a plane, and the other a perpendicular to that plane. The angle formed by the perpendicular and the line of departure taken by the elastic body is called the angle of reflection, and is always equal to the former one. Line of incidence, the straight line taken by a ray of light or heat, or an elastic body moving to strike a plane at an acute or right angle.

Incledon, Charles Benjamin, an English singer; born in St. Kevern, Cornwall, in 1763. He made his first appearance as Alphonso in the "Castle of Andalusia." From 1786 to 1790 he sang in the summer at Vauxhall Gardens, and in the winter at Bath. In September, 1790, he appeared at Covent Garden Theater as Dermot in the "Poor Soldier"; and for 25 years thereafter he remained unrivalled as a ballad singer. In 1817 he visited the United States. He died in Worcester, Feb. 11, 1826.

Inclination, the mutual approach, tendency, or leaning of two bodies, lines, or planes toward each other, so as to make an angle where they meet, or where the lines of their direction meet. This angle is called the "angle of inclination." In pharmacy, the act by which a clear liquor is poured off from some fæces or sediment by only stooping the vessel; also called decantation.

Inclined Elevator, a moving stairway. It consists practically of a moving band, to which are attached a number of hardwood slats, ridged with rubber. These give a comfortable footing for the passengers, who step on the moving band at the bottom of the staircase, take hold of a moving handrail, and are carried up to the landing, where the stepping off is perfectly easy and absolutely safe. The inclined elevator is safe and noiseless; it requires no attendant to run it; it may be started or stopped at either end by pressing a button; it is always ready for use, and consumes power only in proportion to the number of passengers elevated. It has become an attractive feature in the great department stores of the United States.

Inclined Plane, one of the mechanical powers. It consists of a plane, inclined obliquely to the horizon. The velocity acquired by a body descending an inclined plane is the same as if it had fallen perpendicularly from the same height. The inclined plane is used for the descent of bodies; also for the ascent, by vehicles, etc., of hills far too steep to be directly scaled by wheeled carriages.

Inclined Strata, strata which dip at an angle with the horizon.

In Cœna Domini (in sē'nä dom'in-ī), a celebrated papal bull, so called from the ancient day of its annual publication, Holy Thursday. It is not, as other bulls, the work of a single Pope, but, with additions and modifications at various times, dates back to the Middle Ages. Its present form, however, it received from the Popes Julius II., Paul III., and finally Urban VIII., in 1627, from which year it continued for a century and a half to be published annually on Holy Thursday. It may be briefly described as a summary of ecclesiastical censures, especially of those with which grievous violation of the faith of the Church, or of the rights of the Church, or of the Roman see, are visited; excommunication being denounced against heresy, schism, sacrilege, usurpation of the rights of the Church or of the Pope, forcible and unlawful seizure of church property, personal violence against ecclesiastics, etc. The bull also denounces other crimes, as piracy, plunder of shipwrecked goods, and forgery.

Incombustible Substances, those which have been so prepared as to be incapable of being kindled or of being consumed by fire. Cloth made of the fibers of asbestos, by weaving, will bear a considerable heat without injury. Incombustible cloth is also made by preparing cotton and linen fabrics with solutions of borax, phosphate of soda, phosphate of ammonia, or sal-ammoniac. Cloth so prepared may be placed in contact with ignited bodies without suffering active combustion or bursting into flames. Tungstates of the alkalies have also been successfully used for similar purposes. All these substances act by forming a species of glaze on the surface of the fibers, which excludes them from the air. They do not, however, prevent carbonization from taking place when the temperature is very high. Solutions of alum and common salt also have been used for similar purposes; and latterly, a starch mixed with sulphate of zinc and sulphate of ammonia.

Income Tax, a tax levied directly from income of every description, whether derived from land, capital, or industry, first imposed in Great Britain in January, 1799, during the ministry of Pitt. The rate of income tax in Great Britain varies from year to year, being 8d. in the pound for 1900. Incomes under £150 are usually exempted. In the United States an income tax was first imposed in 1861 of 3 per cent. on incomes over $800, those derived from United States bonds being 1½ per cent.; citizens of the United States residing abroad were taxed 7½ per cent. In 1865 the tax was increased from 3 to 5 per cent., and the 5 per cent. tax on incomes over $10,000 was changed to 10 per cent. upon the excess over $5,000. In 1867 (the exemption having been as low as $600) the tax was

uniformly 5 per cent. on all incomes in excess of $1,000. The tax ceased June 30, 1870. The entire amount realized in 10 years was nearly $365,000,000, affecting about 250,000 persons. An income tax was again imposed in 1894, as a feature of the tariff act of that year. But this feature of the act was declared unconstitutional by a decision of the United States Supreme Court in 1895.

Incommensurable, a state of deprivation or non-existence (as regards two kindred quantities) of a common unit, or, more strictly a magnitude which cannot be measured by another, taken as unity. Two quantities of the same kind are incommensurable with respect to each other, when they have not a common unit — that is, when there is no quantity of the same kind so small that it is contained in both an exact number of times. Thus the diagonal and side of a square are incommensurable, for it has been shown that if we denote the side of the square by 1, the diagonal will be denoted by the square root of 2; but the square root of 2 is incommensurable with 1, because the square root of an imperfect square cannot be expressed in exact terms of 1.

Incorruptibles, a section of Monophysites. They arose in Alexandria in the time of Justinian, and were called Incorruptibles because they held that the body of Jesus was incorruptible. Called also Aphthardocetæ, Incorrupticolæ, Julianists, and Phantasiastæ.

Increment, in mathematics, a quantity, generally variable, added to the independent variable in a variable expression. The function also undergoes a corresponding change, which is called an increment or decrement, according as the function is increasing or decreasing. When the increment or decrement is infinitely small, it is caled a differential.

Increment, Unearned, the increase in the rent of land due to the growth of industrial undertakings and of towns, and the general progress of society. Because obtained without exertion or the expenditure of capital on the part of the owners of the land, some economists maintain that it should be specially taxed.

Incubation, in pathology, the maturation of morbific matter introduced into the system. The word has reference, also, to the act of sleeping for oracular dreams. The sick who visited the temples of Æsculapius had to spend at least one night in his sanctuary observing certain rules prescribed by the priests, and the fitting remedies were usually revealed by the god in a dream. Cicero jestingly asks why this power should only be exercised by Æsculapius and Serapis, and not by other divinities.

Artificial incubation is the hatching of eggs by means of heat artificially applied. The Egyptians have long done so successfully by means of heated ovens. Some years ago it was calculated that a hundred million chickens were thus annually produced in Egypt. In late years the hatching of eggs by incubation has become a lucrative business in many sections of the United States.

Period of incubation, in pathology is the interval that elapses between the introduction of morbific matter into the body, and the commencement of the disease thence resulting. In measles this is from 10 to 14 days; in scarlet fever, 4 to 6 days; in smallpox, 12 days, etc.

Incubus, a lascivious spirit appearing only by night, credited with the power of producing supernatural births by actual intercourse with women. Such a belief existed among the Jews, "for a wicked spirit loveth her" (Tobit vi: 41). Allusion to it is found in Augustine's works; in the Middle Ages it was fully accepted by theologians and lawyers, and scores of women were burnt for an impossible crime. How long a belief in incubi lingered in England may be seen in Burton's "Anatomy of Melancholy," where copious references are given; and Leuret may be consulted for the views of St. Bernard and those of the physicians of La Salpetrière on the subject. According to Tylor a belief in incubi still exists among many races of low culture. In pathology, an incubus is a sensation of an oppressive weight at the epigastrium during sleep, and of an incapability of moving or speaking; NIGHTMARE (*q. v.*)

Incumbent, the rector, parson, or vicar holding an ecclesiastical benefice in England. It is the common title in Scotland of Episcopal clergymen holding charges.

Incunabula (in-kun-ab′ū-lä), a term applied by bibliographers to editions of books printed during the early period of the art, and is generally limited to works which appeared previous to 1500.

Incus, one of the small bones of the ear. It stands between the malleus and the stapes, and is connected with them by articular surfaces. It does not resemble an anvil so closely as it does a tooth with two fangs widely separated. These constitute a body and two processes. The incus is represented only by a ligament in birds, by a cartilage in sphenodon (*Hatteria*) and other reptiles, and by the hyo-mandibular bone in osseous fishes.

Ind, a poetic diminutive for the land of India.

Indemnity, an act designed to relieve the government or any of its officers from penalties when they have been compelled by exceptional circumstances to omit the per-

formance of some duty, or to violate or even to suspend some law.

Indented, in heraldry, a term signifying notched like the teeth of a saw, but smaller than dancette. Applied to one of the lines of partition; ordinaries are also thus borne.

Indenture, a deed entered into between two or more parties, and so called because duplicates of every deed between two or more parties were once written on one skin, which was cut in half, with a jagged or indented edge; so that they were seen to belong to one another.

Independence, Declaration of. See DECLARATION OF INDEPENDENCE.

Independence, a city and county-seat of Buchanan co., Ia.; on the Wapsipinicon river and the Burlington, Cedar Rapids and Northern, and the Illinois Central railroads; 69 miles W. of Dubuque. The city is the farming trade center for the county, and is widely known for its trotting horse breeding farms. Two miles distant, and connected with the city by a trolley line, is the State Insane Hospital. The surrounding region is agricultural. The city has steam grist mills, planing mills, brick yards, grain elevators, and a number of manufactories. There are a public library, 2 National banks, public high school, 3 weekly newspapers, and an assessed property valuation of nearly $1,000,000. Pop. (1890) 3,163; (1900) 3,656.

Independence, a city and county-seat of Jackson co., Mo.; on the Chicago Northern, the Kansas City and Independence, and the Missouri Pacific railroads; 4 miles S. of the Missouri river, and 10 miles E. of Kansas City. It is the seat of Woodland College (Christ.), the Kansas City Ladies' College (Presb.), and a convent and schools of the Sisters of Mercy. The city has public high school, public library, Washington and Fairmount Parks, electric light plants, a National and other banks, tilling and milling plants, and an assessed property valuation of about $3,000,000. Independence was occupied by the Mormons in 1831–1838, and during this period was a noted rendezvous for their emigrants. Its nearness to Kansas City makes many of its business interests common with those of that city. Pop. (1900) 6,974; (1910) 9,859.

Independents. See CONGREGATIONALISM.

Independent Seconds Watch, a timepiece in which the action of the center seconds hand is independent of the regular going works of the watch. It has two separate trains of wheels and separate springs, so that the regular time may be maintained when the center seconds hand is stopped by pressing the stop pin on the outside of the case. The center seconds is set in conformity with the other works by a square at the back of the case. For great nicety in timing, quarter and fifth-second watches are now made, and are capable of being stopped at these fractional parts of a second.

Indeterminate, in mathematics, having an indefinite number of values or solutions. Indeterminate analysis is a branch of algebra in which there are always given a greater number of unknown quantities than there are independent equations, by which means the number of solutions is indefinite.

Index, a compilation of figured or numbered entries for purposes of reference. In mathematics, the index of a radical is a number written over the radical sign to denote the degree of the root to be extracted. An index is generally a whole number greater than 2. When the square root is indicated, the index is generally omitted, being understood.

Congregation of the Index is a congregation founded by Pius V. in 1571. It consists chiefly of cardinals, nominated by the Roman Pontiff, with other members, who are called consultors. The secretary is always a Dominican. Its duty is to examine and correct, or prohibit the reading of, books which it deems heretical, or which contain matter dangerous to faith or morals.

Index Prohibitorius, a list of books which may not be read by Roman Catholics, cleric or lay, on pain of excommunication. Livy testifies to the practice of burning books of magic in pagan Rome, and the Ephesian converts who used "curious arts" voluntarily did the same (Acts xix: 19). Prior to the invention of printing, there were many cases in which the Roman pontiffs had suppressed the writings of authors whom they judged heretical. The Council of Constance (1415) ordered the books of Huss to be burnt, and Leo X. condemned the writings of Luther. In the 17th session (Feb. 26, 1562) of the Council of Trent, a commission was appointed to compile an Index of Prohibited Books and a code of general rules on the subject. The first Index was published (1564) in the pontificate of Pius IV., and various editions have since appeared.

India, an extensive region of Southern Asia, celebrated during many ages for its riches and valuable natural productions, its beautiful manufactures and costly merchandise, the magnificence of its sovereigns, and the early civilization of its people. HITHER INDIA is the central peninsula of Southern Asia; its length may be stated approximately at 1,900 miles, and its width at 1,600 miles, with an area of about 1,300,000 square miles. The natural boundaries of this vast region are, on the N., the range

of the Himalaya Mountains which separates it from Tartary, China, and Tibet; on the W. the Suliman Mountains divide it from Afghanistan and Beloochistan; on the S. the Arabian Sea and the Gulf of Bengal; and on the E. the hill ranges which separate Chittagong and Assam from Burma. From the mouth of the Brahmaputra and the Indus the E. and W. coasts, inclining toward the same point, meet at Cape Comorin, and thus give to South India the form of an irregular triangle. The two sides of the triangle have each a coast line of about 2,000 miles. India, from its great extent of sea-board, is essentially a maritime country. FARTHER INDIA is the usual name given to the S. E. peninsula of Asia. The great natural divisions of Hither India are the sub-Himalayan countries, the plain of the Ganges, the plain of the Indus, the highlands of Northern Hindustan, and the peninsular portion of the country to the S. of the Vindhya Mountains.

Topography.— The sub-Himalayan countries form an elevated tract lying between the chief ridge of the Himalayas and the lower elevations which adjoin the plains of the Ganges and Indus. The plain of the Ganges, which includes Bengal, Bahar, the Doab, Oude, and Rohilcund, is a vast alluvial flat, extending from the Bay of Bengal to the Punjab. Scattered over the agricultural districts, and massed in the great cities and towns, there are not less than 100,000,000 people. The plains of the Indus in the N. W. are less extensive than those of the Ganges, and are separated from the latter by the Aravulli Hills. The Punjab occupies the N. portion. S. of the Punjab, and parallel with the river, the great sandy desert of the Indus extends for nearly 500 miles. The horse and camel alone can cross this desert, which is described in Hindu geography as "the region of death." Like the Terai, it forms a great physical barrier which separates West and East India. The highlands of Northern Hindustan extend from the Vindhya Mountains as a base to the border of the Thur. They include the tableland of Malwa and Rajpootana or Rajasthan, which has an elevation of about 2,000 feet above the level of the sea. The peninsular portion of India, S. of the Vindhya Mountains, is called by the natives the Deccan. The most remarkable geographical feature of the area is a central table-land — vast plateau — rising from 2,000 to 3,000 feet above the sea, and inclosed on all sides by lofty mountains, between which and the sea, on the E. and W., are narrow strips of low, flat country, divided into several districts. From the low country on the coast to the central table-land the mountains rise abruptly in a succession of gigantic terraces or steps, and hence the name of "Ghauts."

Population.— The census of 1901 showed a total population of 294,266,701. Of these about 661,000 were not born in India. The British-born are given at over 100,000. The population of the principal cities, according to the census of 1901, had either decreased since 1891 or increased only slightly. Thus Bombay, which returned in 1891 a population of 821,764, had in 1901 barely 777,000.

Vegetable Productions.— The vegetation of Indian is as varied as its soil and climate, passing from the flora of a tropical to that of an alpine region. The groves of palm that border the coast, and, in the interior, the umbrageous mango topes, are striking features of Indian scenery. Rice is the chief article of food in India, and is produced in all parts of the country in which irrigation is practised. Maize and wheat are the grains cultivated in the Northwest Provinces. Opium is one of the most valuable products of India. Coffee is largely produced in Ceylon, and the cultivation of the plant is rapidly spreading in South India. Tea cultivation is now carried on with success in Assam, and is spreading over all the hill countries of Northwest India. Cinchona, introduced from South America in 1860, has been naturalized with great success. The growth of cotton has been much extended. The finest is produced in Berar. The rhea, or jute plant, is grown in Assam and Bengal, and has recently given rise to an important trade. India rubber is another important product of Assam, the demand for which is increasing. Within the last 15 years great attention has been paid to the importance of preserving the Indian forests. The destruction of the woods was found to give rise to destructive floods, and to render the water supply uncertain and capricious during the dry season. The Indian cultivators have been improving in prosperity, and with that improvement there has been an increasing demand for timber for house-construction and furniture — a demand further augmented by the requirements of the railways. In order to protect existing forests and extend the area of the timber-producing districts the Indian Forest Conservancy Department was organized.

Animals.— The domesticated animals are horses, asses, mules, oxen, buffaloes, sheep, and elephants. Of wild beasts the most formidable is the Bengal tiger. The other beasts of prey are leopards, wolves, jackals, panthers, bears, hyenas, lynxes, and foxes. Of poisonous snakes the cobra da capello or black-hooded snake, the cobra manilla, and the sand snake are the most common. The number of people killed by wild beasts is a feature of Indian life. In one year a tigress killed 127 people, and stopped a public road for many weeks, and 14,529 were known to

have lost their lives in that year by snake bites. In a single year the total number of deaths known to have been caused by dangerous animals of all classes was 18,078.

Climate.— Hindustan proper may be said to have three well-marked seasons,— the cool, the hot, and the rainy. The cool months are November, December, January, and a part of February; the dry hot weather precedes, and the moist hot weather follows, the periodical rains. The climate of South India is greatly regulated by the monsoons. The central table-land is cool, dry, and healthy.

Social System of Government.— Two of the most striking peculiarities of the social condition of the Hindus are the iron institution of caste and the village system. The latter is very simple. A village in Hindustan does not mean a collection of houses at a particular spot, but corresponds rather to what is called a township in America. It is a district embracing an area of some hundreds or thousands of acres of land, and is under the administration of native functionaries, the principal of whom is the *potail* ("head inhabitant"), a kind of chief magistrate, who superintends the affairs of the community, settles disputes, attends to the police and the collection of taxes. Under this simple form of municipal government the inhabitants of the country have lived from time immemorial. The boundaries of the villages have been but seldom altered; and though the villages themselves have been sometimes injured, and even desolated, by war, famine, and disease, the same limits, and even the same families, have continued for ages.

Religion, Philosophy, History, etc.— Hindu theology is contained in the ancient books of the Vedas, which inculcate the worship of the deities, Brahma, Vishnu, and Siva, the transmigration of souls, and their final absorption into the deity. Buddhism had also its origin in Hindustan, and Mohammedism now extensively prevails. Philosophy, science, and the arts were cultivated from an early period by the Hindus, especially the domestic arts of weaving, dyeing, and working in metals and gems. They have never greatly excelled in music or painting; but in architecture they have arrived at considerable eminence. From the earliest records of history the nations of the Western World derived their merchandise from India. The country was entered and partly subdued by Alexander the Great. About 126 B. C. it was also invaded by the Tartars, or Scythians of the Greeks. From the 10th to the 12th century of the Christian era the Mohammedans overran and conquered considerable portions of Hindustan, and subsequently the Mogul empire was formed. In 1428 India was first visited by Vasco de Gama, and later the Portuguese and Dutch established settlements on the peninsula, but the former never acquired more than a paltry territory on the W. coast, and the latter a few commercial factories. The French influence in India, at one time considerable, also yielded to the superior enterprise of the British, and finally the French relinquished the field. In 1625 the first English settlement was made by a company of merchants in a small spot of the Coromandel coast of 5 square miles, transferred in 1653 to Madras. A short time previous a settlement had also been obtained at Hooghly, which afterward became the Calcutta station. In 1687 Bombay was erected into a presidency. In 1773, by act of the British Legislature, the three provinces were placed under the administration of a governor-general, and Calcutta was made the seat of a supreme court of judicature, the presidencies of Madras and Bombay being made subordinate to that of Bengal. Hitherto the affairs of India had been managed by the East India Company, but in 1784 a board of control was appointed by the government, the president of which became secretary of state for India. From the year 1750, when the warlike acquisition of territory commenced under Lord Clive, a succession of conquests, almost forced upon the British contrary to their inclinations, have now placed nearly all India under their sway. There is a free press and equal laws to all subjects. The revenue is derived almost entirely from a land tax. Under the zemindary system, established in Bengal, the zemindars, formerly a sort of collectors, have been constituted the actual proprietors of the soil, and have become bound to pay a fixed and permanent assessment, amounting to about one-half the produce. In Madras an assessment varying according to the productiveness of the soil is adopted under the name of the ryotwary system. The village system, prevalent in the native states and in some parts of Bengal and the Nerbudda districts, consists in the assessments being collected from the cultivators of the soil through the medium of native village officers, appointed by each community without the direct interference of government. These rent assessments are very high, and bear hard on the cultivators of the soil; yet the condition of the population under British rule is greatly ameliorated from that under the unsteady governments and the incessant wars and conquests of previous periods of their history. India was one of the earliest fields of Christian missions. Tradition assigns it as the scene of the apostle Thomas's labors and martyrdom. Whether this were the case or not, we find a Syrian church planted in Malabar, in South India, which undoubtedly had a very early origin. The Jesuit missionaries, from the middle of the 16th century onward, had

large success in India. The Catholic missions now confine their attention to their Christian converts. They are divided into two branches — the Portuguese or Goa branch, and the Jesuit mission. The number belonging to the former in Bombay is not known; they number elsewhere 48,000. The Jesuit converts exceed 500,000 in Madras, Pondicherry, and Travancore. The earliest Protestant missionaries in India came from Holland and Denmark. With the latter mission the eminent Schwartz was connected. England's first missionary effort was put forward by the Society for the Propagation of the Gospel, and the Christian Knowledge Society, which commenced in the beginning of the 18th century by aiding the Danish mission already established in South India. Subsequently the East India Company adopted the policy of excluding missionaries altogether from their territories; but since the beginning of the 19th century, when these restrictions were withdrawn, a great work has been entered on, in which all denominations are represented. In Bengal 16,000 ryots profess Protestantism. In Chota Nagpore German missionaries have converted 20,000 Koles. In Oude and Rohilcund there are 2,000 converts. In South India the numbers are much greater.

Governors-General.—The following is a list of the governors-general, with dates of appointment.

Warren Hastings, 1772.
Sir J. McPherson, 1785.
Earl (Marquis) Cornwallis, 1786.
Lord Teignmouth (Sir J. Shore), 1793.
Earl of Mornington (Marquis Wellesley), 1798.
Marquis Cornwallis, 1805.
Sir G. Barlow, 1805.
Earl of Minto, 1807.
Earl Moira (Marquis of Hastings), 1813.
Earl Amherst, 1823.
Lord W. Bentinck, 1828.
Lord Auckland, 1835.
Lord Ellenborough, 1842.
Sir H. (Lord) Hardinge, 1844.
Earl Dalhousie, 1847.
Lord Canning, 1855.
Lord Elgin, 1862.
Sir John Lawrence, 1863.
Earl of Mayo, 1868.
Lord Northbrook, 1872.
Lord Lytton, 1876.
Marquis of Ripon, 1880.
Earl Dufferin and Ava, 1884.
Marquis of Lansdowne, 1888.
Lord Elgin, 1893.
Lord Curzon, 1898.
Earl of Minto, 1905.
Lord Penshurst, 1910.

India, British, the name given to those parts of Hither and Farther India placed under the administration of the viceroy or governor-general of India. It does not include Ceylon, which, though a British possession, has its government entirely separate from that of Hindustan, but it extends along the E. coast of the Bay of Bengal, and includes a part of Farther India, or Indo-China. Pop. (1901) 231,085,132. The home government of India is vested in a secretary of state, who is a member of the English cabinet. He is assisted by an under-secretary and a council of 15 members. The Indian executive government is administered by the viceroy or governor-general appointed by the British crown, and acting under the control of the secretary of state for India. The viceroy is appointed by the British crown for a term of six years, and is assisted by a council of six ordinary members. Each of them has charge of a department of the executive. The commander-in-chief may be constituted an extraordinary member of the council.

Indiana, a State in the North Central Division of the North American Union; bounded by Ohio, Kentucky, Illinois, Michigan, and Lake Michigan; admitted to the Union Dec. 11, 1816; number of counties, 92; capital, Indianapolis; area, 36,350 square miles; pop. (1890) 2,192,404; (1900) 2,516,462; (1910) 2,700,876.

Topography.— The surface of the State is generally level or undulating, ranging from 300 to 1,250 feet in altitude. The hills of the Ohio and Wabash river valleys inclose richly wooded bottom lands. The W. portion of the State is mostly prairie lands, interspersed with lakes, wood lands, and swamps. The rivers are mostly affluents of the Ohio and include the Indian Kentucky, Silver, Indian Blue, Big Pigeon, Little Pigeon, and Laughery. The Wabash, rising in Ohio, flows 500 miles through the State, and is navigable for 300 miles. The Maumee is formed in Allen county, by the junction of the St. Joseph s and St. Mary's, and flows N. E. through Ohio, into Lake Erie. The Kankakee flows 100 miles through the State and forms one of the constituents of the Illinois. There are several lakes and large ponds with clear water and sandy shores and bottoms. Beaver Lake, near the Illinois line, once covering an area of 10,000 acres, has been drained nearly dry.

Geology.— Aside from Silurian deposits in the extreme N. W. and S. E. parts of the State, the entire surface is overlaid with Devonian and sub-carboniferous rocks. Three distinct varieties of bituminous coal are found in great abundance and the limestone region in the S. contains many sink holes and caves. The Wyandotte cave in Crawford county, is second only to the Mammoth cave in size. The coal measures cover an area of 6,500 square miles, with a depth of 600 to 800 feet, and present 12 to 14 distinct seams, ranging from 1 to 11 feet in thickness.

Mineralogy.— The State is rich in mineral resources, especially in coal. Block coal, used in pig iron smelting, is mined in blocks weighing upward of a ton each, and cannel coal and peat are found in abundance. Quarries of building stones cover an area of 200 square miles, adjoining the coal measures. In 1899 the chief mineral productions included: Coal, 6,-

Indiana

006,523 short tons, valued at $5,285,018; petroleum, 3,848,182 barrels, valued at $3,363,738; mineral waters, 184,025 gallons, valued at $46,331; clay, 3,000 tons, valued at $3,383; natural gas, valued at $6,680,370; sandstone, valued at $35,636; and limestone, valued at $2,173,833. The State ranks second in the United States in its production of natural gas and limestone, third in coal, and fourth in petroleum. Other mineral productions were bog iron, antimony, bismuth, cobalt, ganister, lead, manganese, sulphuret of silver, and salt.

Soil.— The soil varies from a deep black sand to clay loam, and is generally fertile, excepting along the lake front. The river valleys of the Wabash and Whitewater are particularly fertile. The climate is changeable and marked by extremes. Nearly one-eighth of the area is open prairie, and well adapted to agriculture. The trees include the white, red, black, and blue oak, ash, beech, hickory, sycamore, elm, tulip, black walnut, red and sugar maple, tamarack, sumach, dogwood, and wild plum.

Agriculture.— The State is largely engaged in agricultural pursuits. All farm and garden vegetables and fruits are grown, and wheat, corn, oats, tobacco, hemp, flax, maple sugar, maple syrup, sorghum molasses, honey, beeswax, cider, vinegar, hops, and wine are among the varied products. In 1900 the production of corn amounted to 153,200,800 bushels, valued at $49,024,256; oats, 44,866,035 bushels, valued at $10,319,188; wheat, 6,411,702 bushels, valued at $4,488,191; potatoes, 9,060,529 bushels, valued at $3,443,001; hay, 1,663,452 tons, valued at $16,218,657; rye, 485,722 bushels, valued at $242,861; barley, 185,533 bushels, valued at $87,201; and buckwheat, 70,154 bushels, valued at $42,794. The domestic animals on farms and ranches in the State, Jan. 1, 1900, were: Horses, 777,220, valued at $29,337,792; mules, 38,734, valued at $3,141,258; sheep, 77,905, valued at $2,713,993; milch cows, 605,850, valued at $20,447,606; and other cattle, 829,075, valued at $20,536,787.

Manufactures.— According to the Federal census of 1900 there were 18,015 manufacturing establishments, employing $234,481,528 capital and 155,956 persons; paying $66,052,160 for wages and $214,961,610 for materials; and yielding products of a combined value of $378,120,140.

Banking.— On Oct. 31, 1901, there were 137 National banks in operation, having $16,377,040 in capital, $8,063,524 in outstanding circulation, and $7,370,550 in United States bonds. There were also 106 State banks, with $4,682,719 capital, and $782,014 surplus; 69 private banks, with $1,578,164 capital, and $247,659 surplus; and 29 trust and loan companies, with $3,424,320 capital, and $283,500 surplus. In the year ending Sept. 30, 1901, the exchanges at the United States clearing houses at Indianapolis and Evansville aggregated $240,811,705, an increase over the previous year of $43,781,007.

Education.— In 1899 the school population was 668,100; the enrollment in public schools, 556,651; and the average daily attendance, 424,725. There were 9,983 public school buildings; 15,488 teachers; public school property valued at $25,000,000; receipts of the year, $7,441,546; and expenditures, $8,188,089. For higher education there were 362 public high schools, 28 private secondary schools, 2 public and 10 private normal schools, and 22 universities and colleges for men and for both sexes. Among the latter are Indiana University, at Bloomington; Purdue University, at Lafayette, De Pauw University, at Greencastle; University of Notre Dame, at Notre Dame; Concordia College, at Fort Wayne; and Franklin College, at Franklin.

Churches.— The strongest denominations in the State are the Methodist Episcopal, Roman Catholic, Disciples of Christ, Regular Baptist, United Brethren, Presbyterian, Friends, Lutheran, and Christians. In 1899 there were 5,617 Evangelical Sunday-schools, with 68,389 officers and teachers, and 515,568 scholars.

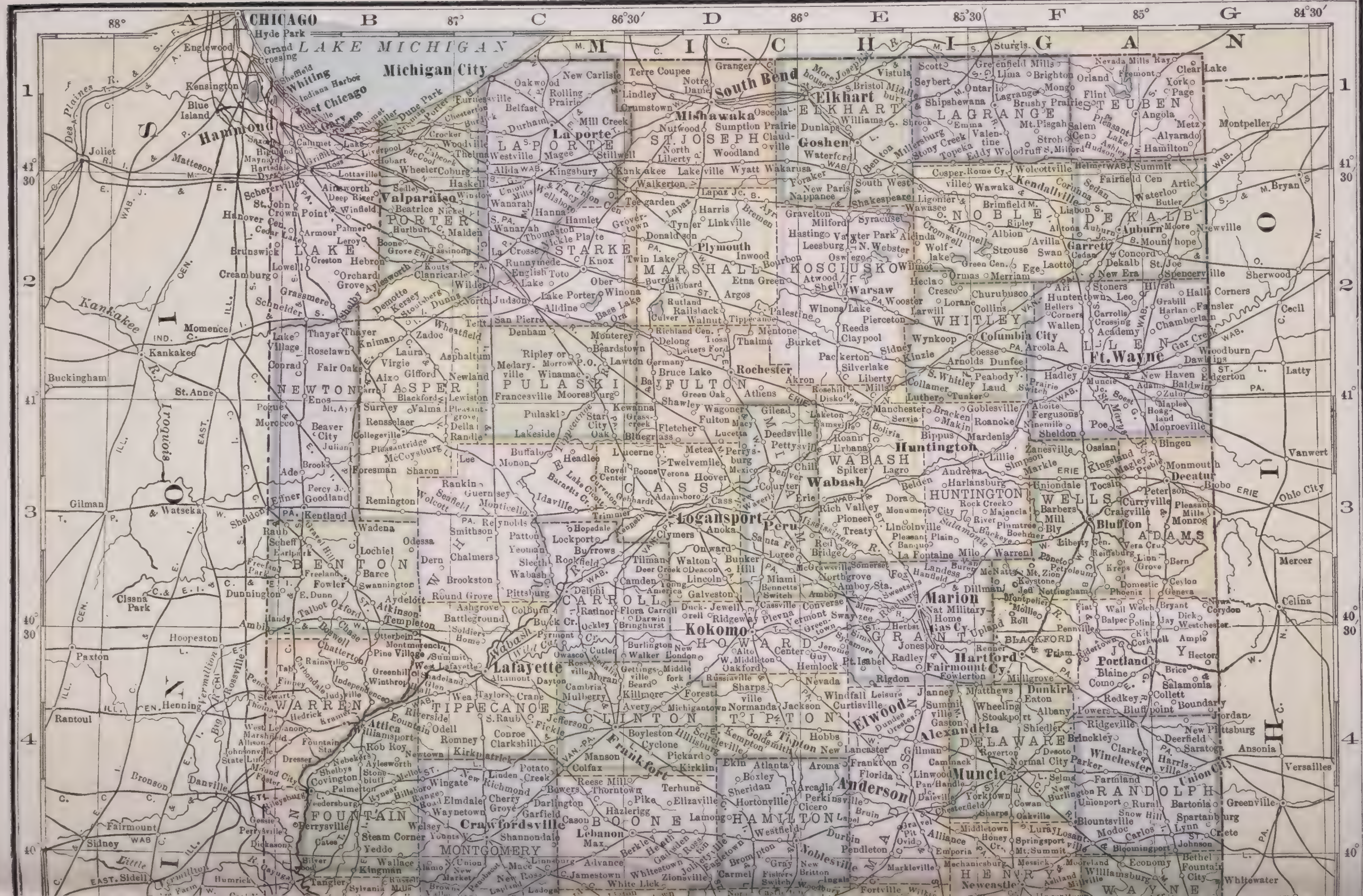
Railroads.— The total length of railroads within the State, Jan. 1, 1901, was 6,579 miles, of which 77 miles were constructed during the previous year.

Postoffices and Periodicals.— In 1901 there were 2,202 postoffices of all grades, and 862 periodicals, of which 149 were daily, 25 semi-weekly, 592 weekly, 1 bi-weekly, 10 semi-monthly, 81 monthly, and 3 quarterly.

Finances.— The total assessed valuation of all taxable property in the State in 1899 was $1,342,831,161; and the total tax rate (per $1,000) $2.96 2-3, of which $.90 was State tax and the rest benevolent institution, school, and debt sinking tax. The total debt on Jan. 10, 1901, was $4,504,614; the total annual interest amounting to $150,075.

State Government.— The governor is elected for a term of four years, and receives a salary of $5,000 per annum.. Legislative sessions are held biennially, and are limited to 60 days each. The legislature has 50 members in the Senate, and 100 in the House, each of whom receives $5.00 per day and mileage. There are 13 representatives in Congress. In 1904 the government was Republican.

History.— Indiana was part of the territory ceded to Great Britain, in 1763, by France. Early settlements had been made by the French at Corydon and Vincennes in 1702. After the American Revolution the Indians gave considerable trouble to the


CHICAGO
Hyde Park
Grand Crossing
LAKE MICHIGAN
Michigan City
Englewood
Kensington
Blue Island
Whiting
Indiana Harbor
East Chicago
Gary
Hammond
Joliet
Matteson
Sheffield
Des Plaines R.
Dunes Park
Furnessville
Chesterton
Porter
Burdick
Miller
Tolleston
Glenwood
Dyer
Schererville
St. John
Hanover Cen.
Cedar Lake
Crown Point
Winfield
Lowell
Creston
Hebron
Orchard Grove
Creamburg
Brunswick
Aetna
Aix
Ainsworth
Deep River
Beatrice
Nickel
Palmer
Armour
Leroy
Boone Grove
Tassinong
Valparaiso
PORTER
LAKE
Hurlburt
Malden
Clanricarde
Wilder
Routs
Kankakee R.
Momence
Kankakee
Buckingham
St. Anne
Grassmere
Schneider
Shelby
Ayresworth
Demotte
Kersey
Stoutsberg
Dunns
North Judson
Wheatfield
Tefft
San Pierre
Thayer
Kniman
Zadoc
Lake Village
Roselawn
Conrad
Fair Oaks
Laura
Virgie
Aix
Gifford
Newland
Asphaltum
NEWTON
JASPER
Enos
Pogue
Morocco
Mt. Ayr
Surrey
Valma
Blackford
Lewiston
Pleasant-grove
Della
Randle
Beaver City
Rensselaer
Collegeville
Julian
Brooks
Ade
Foresman
Sharon
Pleasantridge
McCoysburg
Lee
Rankin
Guernsey
Wolcott
Seafield
Monticello
Remington
Percy
Goodland
Effner
Kentland
Gilman
Watseka
Sheldon
Raub
Scheff
Earlpark
Hazel Hill
Wadena
Odessa
Lochiel
Dern
Chalmers
Brookston
Round Grove
Reynolds
Smithson
Patton
Yeoman
Hopedale
Lockport
Byrrows
Rockfield
Sleeth
Wabash
Pittsburg
Delphi
Camden
Deer Creek
Deacon
Lincoln
Tilman
Walton
Onward
Anoka
Clymers
Logansport
Peru
Miami
Bunker Hill
Bennetts Switch
Galveston
Cassville
Converse
Amboy
Amboy Sta.
Somerset
Fox
Sweetsers
Landess
Handfield
Dillman
Marion
Nat Military Home
Gas Cy.
Upland
Jonesboro
Radley
Fairmount Cy.
Fowlerton
Hartford
Millgrove
Rigdon
Janney
Summitville
Gaston
Elwood
Alexandria
Matthews
Wheeling
Stockport
Albany
Eaton
Dunkirk
Shiedler
Ridgeville
Brinckley
DELAWARE
Roverton
Desoto
Normal City
Muncie
Linwood
Pan Handle
Daleville
Yorktown
Chesterfield
Sharpe
Oakville
Cowan
Burlington
Farmland
Parker
Winchester
Harrisville
Union City
RANDOLPH
Unionport
Rural
Bartonia
Greenville
Snow Hill
Modoc
Carlos
Spartanburg
Lynn
Crete
Johnson
Bloomingport
Bloomingsville
Springsport
Mt. Summit
Luray
Losantville
Middletown
Honey Cr.
Alliance
Emporia
Ovid
Gravel Pit
Durbin
Pendleton
Noblesville
Markleville
Mechanicsburg
Messick
Mooreland
Economy
Williamsburg
Millville
Ashland
Fountain City
Whitewater
HENRY
Newcastle
WAYNE
Kokomo
HOWARD
Center
Jerome
Guy
Hemlock
Pt. Isabel
Sycamore
Sims
Herbst
Green-town
Vermont
Sway-zee
Plevna
Ridgeway
Jewell
Duck-orell
Flora
Carroll
Darwin
Bringhurst
Ratnor
Cassville
Converse
Lafayette
TIPPECANOE
Altamont
Dayton
Cambria
Mulberry
Crane
Taylors
Wea
Riverside
Odell
Romney
Kirkpatrick
Conroe
Clarkshill
S. Raub
Jefferson
Fickle
Boylston
Hillisburg
Scircleville
Kempton
Goldsmith
Tipton
New Lancaster
Hobbs
Cyclone
Pickard
Kirklin
Colfax
Manson
Ekin
Atlanta
Aroma
Frankton
Florida
Camnack
Gilman
Roverton
Desoto
Normal City
Parker
Winchester
Harrisville
Union City
Ansonia
Versailles
Deerfield
Saratoga
Dawkins
Woodburn
Edgerton
Latty
Zulu
Soest
Muncie
Adams
Baldwin
New Haven
Hadley
Prairie Switch
Peabody
Laud
Tunker
Luther
Collamer
Mills
Roschill
Disko
Liberty
Sidney
Kinzie
Coesse
Arcola
Columbia City
Wynkoop
Larwill
Wooster
Pierceton
Reeds
Claypool
Winona Lake
Palestine
Tippecanoe
Culver
Railsback
Rutland
Hibbard
Burdick
Atwood
Shelby
Warsaw
Wilmot
Ormas
Merriam
Heclaw
Cresco
Churubusco
Collins
Lorane
WHITLEY
Hellers Corners
Wallen
Carrolls Crossing
Academy
Chamberlain
Harlan
Grabill
Hirsh
Stoners
Leo
Ari
Huntertown
Van
New Era
Spencerville
Sherwood
Cecil
Gar Creek
Woodburn
Dawkins
Latty
Edgerton
Ft. Wayne
Hadley
New Haven
Adams
Baldwin
Zulu
Muncie
Soest
Goblesville
Aboite
Fergusons
Ninemile
Sheldon
Poe
Roanoke
Bracken
Makin
Manchester
Servia
Bippus
Mardenis
Huntington
HUNTINGTON
Rock Creek
Majenica
Monument City
Salamonie
Lincolnville
Pleasant Plain
Banquo
La Fontaine
Milo
Warren
Poneto
Petroleum
Mt. Zion
Keystone
Jed
Nottingham
Montpelier
Fiat
Wall
Welch
Bryant
Dick
Westchester
Balpec
Poling
Jay
Kit
Corkwell
Ample
Hector
Portland
Blaine
Como
Brice
Salamonia
Collett
Boundary
Jordan
Pittsburg
Redkey
Bluffpoint
Powers
Ridgeville
Shiedler
Brinckley
Deerfield
Saratoga
Ansonia
Versailles
Union City
Harrisville
Winchester
Parker
Clarke
Normal City
Desoto
Roverton
Gilman
Camnack
Frankton
Florida
Linwood
Pan Handle
Daleville
Yorktown
Chesterfield
Sharpe
Oakville
Cowan
Burlington
Farmland
Union-port
Rural
Bartonia
Greenville
Snow Hill
Modoc
Carlos
Spartanburg
Lynn
Crete
Johnson
Bloomingport
Bloomingsville
Springsport
Mt. Summit
Luray
Losantville
Middletown
Honey Cr.
Alliance
Emporia
Ovid
Gravel Pit
Durbin
Pendleton
Noblesville
Markleville
Mechanicsburg
Messick
Mooreland
Economy
Williamsburg
Millville
Ashland
Fountain City
Whitewater
HENRY
Newcastle
WAYNE
Anderson
Florida
Aroma
Ekin
Atlanta
Borley
Sheridan
Arcadia
Perkinsville
Cicero
Bruin
Hortonville
Elizaville
Terhune
Thorntown
Reese Mill
Bowers
Darlington
Garfield
Cherry Grove
Richmond
Creek
Linden
Potato
Colfax
Manson
Pickard
Kirklin

INDIANA

SCALE OE MILES

10 5 0 10 20 30 40

State Capital ☆ County Seats ⊙

Hammond's 8 x 11 Map of Indiana

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A 87°30′ B L. 87° Longitude C 86°30′ West D from 86° E Greenwich 85°30′ F 85° G

settlers, but after several years were conquered and brought to peaceful terms by Anthony Wayne. They became troublesome again in 1810, and in 1811 Gov. William Henry Harrison was appointed commander of a force of regulars and militia for the purpose of subduing them. On Nov. 7, 1811, he met and defeated the Indians under Tecumseh, at Tippecanoe, on the Wabash. During the War of 1812, the Indians under British command were again troublesome, but were soon subdued. In 1813 Corydon was made the capital, in 1816 Indiana was admitted to the Union, and in 1825 the capital was removed to Indianapolis. The present constitution was adopted in 1851, and in 1853 a free banking law was passed. WINFIELD T. DURBIN.

Indianapolis, a city of Indiana, capital of the State and county-seat of Marion co. It is situated on the West Fork of White river, at the geographical center of the State and about 35 miles from the center of population of the United States, 183 miles S. E. of Chicago, 242 miles N. E. of St. Louis, 110 miles N. W. of Cincinnati, and 283 miles S. W. of Cleveland. It has an area of about 31 square miles. It is one of the greatest railroad centers in the country. Here enter 18 lines, including divisions of the Big Four, the Pennsylvania, the Cincinnati, Hamilton, and Dayton, and other systems. Here also meet 25 interurban electric lines, using one terminal station. A belt railroad encircles the city and is an artery of all its manufacturing districts. Indianapolis lies in a fertile plain at an elevation of over 700 feet above sea level, and is surrounded by a grain-producing country that contains deposits of coal and building stone.

Streets and Parks.—Indianapolis is noted for the attractiveness of its streets, many of which are of unusual width and are shaded by beautiful trees. There are four long avenues radiating from a central circle, called Monument place, and traversing the city diagonally. The other streets are regularly laid out, and generally cross each other at right angles. There are over 500 miles of improved streets, more than 125 miles of which are paved. Monument place is the site of the magnificent Soldiers' and Sailors' Monument, erected by the State, 285 feet high and surmounted by a figure of "Indiana Triumphant." About its base are grouped bronze figures representing war and peace, and two large fountains on opposite sides with series of bases, while near it are statues of George Rogers Clark, William Henry Harrison, James Whitcomb, and Oliver Perry Morton. The city also has statues of Thomas A. Hendricks and Benjamin Harrison. There are 8 public parks within the city limits, comprising 1,311 acres, and 3 parks just beyond, covering 310 acres. Riverside park (950 acres) extends 5 miles along both sides of White river. University park contains a statue of Schuyler Colfax. Among the other parks are Brookside, Garfield, Military, and St. Clair. Woodruff place is the largest of several parklike areas, partly residential in character, that adorn the city.

Municipal Improvements.—The water supply is furnished by the Indianapolis Water Co., a private corporation. The system has about 300 miles of mains, and with machinery of the highest class it has a pumping capacity of 82,000,000 gallons in 24 hours. The consumption averages over 18,000,000 a day. There are about 200 miles of sewers, and an extensive system of electric lights. The police and fire departments maintain a high degree of efficiency.

Notable Buildings.—The most prominent public building is the State Capitol, built of Indiana limestone, occupying two large blocks, and costing $2,000,000. The court house, erected at a cost of $1,250,000, is an imposing structure. Other buildings of interest are the Federal building, containing the post office, custom house, and United States courts, the United States Arsenal, union passenger station, city hall, Christ Church, First Presbyterian Church, First Baptist Church, Tomlinson Hall, Manual Training High School, Shortridge High School, some of the common schools, Columbia Club, Public Library, Board of Trade building, Traction and Terminal building, Hotel English, Claypool, Denison, and Grand hotels, Commercial Club building, German House, Knights of Pythias building, and the Propylæum, used by women for social and literary purposes.

Churches and Charities.—Indianapolis is the seat of a Roman Catholic and an Episcopal bishop. The city has 175 churches, representing many denominations. The philanthropic institutions include the Alpha Home for Aged Colored Women, Central Indiana Hospital for the Insane, City Hospital, Flower Mission Hospital, German Evangelical Lutheran Orphans' Home, Home for Aged Poor, Industrial Home for Blind Men, Industrial School for Girls, Home for Friendless Women, Rescue Home and Mission, St. Joseph's Home and Industrial School, and many others.

Banks.—In 1907 there were 7 National banks in operation, having a combined capital of $5,100,000, and surplus and undivided profits of over $3,000,000. There were also 3 State banks, 1 private bank, 1 savings bank, and 7 trust companies, with combined resources of about $26,000,000.

Education.—At the end of the school year 1906 the enrollment in public day schools was 31,509, and the average daily attendance 25,200. There were 846 regular teachers; 65 public schools, including 2 large high schools, 1 academic and 1 manual training. Other educational institu-

tions are the University of Indianapolis, Indianapolis Normal School, the John Herron Art Institute, Indiana Kindergarten and Primary Normal Training School, and various special, technical, and professional schools. The Public Library contains over 100,000 volumes. Indianapolis is a prominent publishing center, and a great number and variety of books, periodicals, class and trade journals, and daily and weekly newspapers are published here.

Administration and Public Interests.—The city is governed by a mayor and a council, elected biennially, and by boards and commissions appointed by the mayor, who also appoints the attorney, comptroller, and other subordinates. The city clerk and police judge are elected by the people, as are also the members of the school board, under whom serve various executive officers in direct charge of the public school system. The assessed valuation of taxable property in 1906 was $162,615,205, and the net appraisement $158,087,310. On January 1, 1907, the bonded debt was $2,929,800. The total municipal expenditures for 1906 amounted to $1,726,847.97, and on Jan. 1, 1907, the gross cash balance in the treasury was $587,066.59.

History and Population.—The first settler on the site of Indianapolis arrived in 1819 or 1820. In 1821 the legislature gave the place its name, and in 1824 the State government was removed from Corydon, till then the capital, to Indianapolis, which became the capital on Jan. 1, 1825. In 1847 the first line of railroad in the State was completed from this point to Madison, on the Ohio river, and in the same year Indianapolis was incorporated as a city. The present form of municipal government, in its chief features, was adopted in 1891. During the Civil War the city was a center of great political and military activity, which was accompanied by a rapid increase of population and trade, and from that time the growth and prosperity of Indianapolis have been continuous. Among the men of note who have resided here, Henry Ward Beecher, Benjamin Harrison, and Thomas A. Hendricks may be mentioned as among the most prominent. Population, 1850, 8,090; 1860, 18,611; 1870, 48,244; 1880, 75,056; 1890, 105,436; 1900, 169,164; 1906 (Fed. est.), 219,154; 1910 (census) 233,650.

Indian Archipelago. See EASTERN ARCHIPELAGO.

Indian Bible, a version of the Bible in Algonquin, made by John Eliot, the "Apostle to the Indians." It was published at Cambridge, Mass., the New Testament portion in 1661, the Old Testament in 1663. A revision was printed in 1680-85. This was the first version of the Bible published in America.

Indian Corn. See CORN, INDIAN.

Indian Cress. See TROPÆOLUM.

Indian Fig. See PRICKLY PEAR.

Indian Hemp. See CANADA HEMP.

Indiana University, a coeducational State institution in Bloomington, Ind.; founded as Indiana Seminary in 1820 and chartered as a university in 1828; has an endowment of over $800,000; grounds and buildings valued at over $600,000; scientific apparatus, etc., $116,000; ordinary income, $250,000; volumes in the library, about 65,000; average number of faculty, 85; average students, 2,500; graduates, over 4,500.

Indian Mutiny. The British occupation of India had been largely aided by native troops, which, from 1748, it was the custom to enroll under British officers in the service of the East India Company. At the close of Lord Dalhousie's sway, when the whole of India seemed to have been either reduced directly under British rule, or if retaining its native princes to have placed itself under British protection, a mine was sprung beneath the feet of the Anglo-Indian government by an extensive revolt of this trusted force, and it seemed for a moment as if the fall of British power in India would be more sudden than its rise. The Sepoy mutiny was a contingency for which the government ought not to have been altogether unprepared. Previous symptoms of disaffection had not been wanting. Mutiny had on several occasions broken out in the native army, in a way to indicate how easily, through causes which Europeans, from their defective sympathy with native thought and feeling, could not anticipate, these troops might be alienated; but on the other hand, the general fidelity of the Sepoys merited confidence, and this feeling prevailed over any grounds of suspicion which might have been formed from isolated occurrences. On the outbreak of the first Burmese war the troops destined to be employed in it had shown great disaffection and had deserted in great numbers. The mutiny in one regiment was put down by force and some of the mutineers hanged. The first cause of this disaffection seemed to be the aversion of the troops to a sea voyage, by which they would have forfeited their caste; but when this objection was yielded to a new difficulty arose. The Sepoys, to protect their caste, had to carry about with them their own culinary apparatus, which, consisting of articles of brass, was of considerable weight. The government did not in general charge itself with the expense of procuring carriage for this private baggage, and on a long journey it became a serious matter, and the Sepoys complained with reason of their inability to procure the means of transport. But though this complaint also was met, the disaffection was not subdued without force.

In 1850, again, a wide-spread disaffection arose among the troops under Sir Charles

Napier in the Punjab, in consequence of the refusal of a demand for increase of pay, and that able officer was of opinion that only the decisive measures he took prevented a general revolt at that time.

A number of circumstances concurred to prepare for an outbreak at the time it occurred. The recent annexations had alarmed the native chiefs, while the fanatical Hindus had been deeply offended by reforms, including the successive abolition of various rites of their worship. Two European regiments had been drafted off for the Crimean War, and had not been replaced. Others had been sent to Burma, and in the beginning of 1857 fresh regiments were dispatched to Persia, so that only 18 regiments were left in all Northern India, of which nine were in the Punjab. In Oudh, where, from its recent annexation, disaffection was rife, there was only one British regiment, and Delhi and Allahabad, the two chief arsenals, were guarded by native troops. To add to these favorable circumstances a Hindu devotee had prophesied the termination of British rule at 100 years after the battle of Plassey.

A slight incident sufficed to give point and direction to a spirit of disaffection which so many circumstances tended to favor. It happened that at this time the Enfield rifle was first introduced into the Bengal army. This rifle was loaded with a greased cartridge, the end of which required to be bitten off. A report got abroad that the cartridges were to be soaked in cow and pork fat. The prejudices of Hindus and Mohammedans were thus equally struck at, and as this rumor, however raised, rapidly spread, the excited imagination of the Sepoys conceived a conspiracy on the part of the government to convert them forcibly to Christianity, by compelling them to violate the laws of their own religion. When this grievance was explained it was at once removed, the manufacture of greased cartridges at Dumdum was put an end to, and the men were instructed to grease them themselves with materials procured at the bazars; but suspicion once aroused was not thus to be allayed and easily found a new object to attach itself to. General Hearsey having received advice of a contemplated revolt of four regiments stationed in Barrackpur, harangued the men on Feb. 9, and seemingly allayed their discontent. On the 26th the first overt act of mutiny took place at Berhampur. The men of the 19th Regiment refused to receive their cartridges, though those offered them were not the new cartridges, but the same as they had always used. They were intimidated into compliance at the moment; but during the night they broke into the huts containing their arms which they seized in defiance. Other native troops were called out against them; but as these could not be trusted, the dangerous but probably necessary expedient was resorted to of coming to terms with the mutineers. The authorities now became alarmed, and the 84th Regiment was summoned from Burma. Another dangerous outbreak took place among the 34th at Barrackpur on March 29, and two days afterward the 19th arrived there from Berhampur.

It had been determined by the governor-general that this regiment should be disbanded on its arrival at Barrackpur, a punishment which the authorities still believed would be sufficient to intimidate other disaffected corps. The 34th, in fact, had only waited the arrival of this regiment to concert a movement with them. The 84th Regiment and some other British troops had already arrived at Barrackpur, and the disbandment of the 19th was effected immediately on its arrival. Another outbreak took place on May 2 near Lucknow, when the 7th Oudh irregular cavalry were, by some oversight of the government's instructions, ordered to bite their cartridges. This regiment entered into correspondence with the 48th native infantry, and gave open signs of aggravated mutiny; but Sir Henry Lawrence succeeded by a show of force in disarming it. A more formidable outbreak occurred about the same time at Meerut, 35 miles N. N. E. of Delhi. Eighty-five troopers of the 3d native cavalry, for refusing to use their cartridges, though tearing with the hand was substituted for biting, were tried by a native court-martial, and sentenced to 10 years' imprisonment.

The native troops had planned an outbreak during evening service on Sunday, while the British regiments were at church. It broke out prematurely, and but for the incapacity of Colonel Hewitt, an officer incompetent from age, might have been frustrated. As it was he drew up his troops to cover the barracks, and permitted the mutineers, with the assistance of the native inhabitants, to massacre indiscriminately the Europeans in Meerut, and escape to Delhi. The 28th, 54th, and 74th native infantry, with a battery of artillery, occupied cantonments 2 miles N. of Delhi, the city itself still nominally belonging to the King of Delhi. The advance guard of the mutineers reached Delhi on May 11, and at once entered the city, where they were assisted by the king's servants in massacreing the Europeans. The troops cantoned outside the city in the meantime joined the main body of the mutineers, and assisted in massacreing their European officers. A momentary stand was made in the Flagstaff Tower; but the last remains of the Sepoys proving unfaithful, the few Europeans collected there had to disperse and flee for their lives. About 50 Europeans had taken

refuge in the palace, and placed themselves under the protection of the king. These after some days were coolly murdered.

European troops were now summoned from all quarters. Several regiments were detached from an expedition which was proceeding under Lord Elgin to China, and the Persian war having been concluded, the troops engaged there were immediately recalled. When intelligence of these events reached the Punjab the mutinous spirit which prevailed among the large body of Hindustani troops there was promptly subdued by disarmament. The Sikhs, though the Punjab had been so recently annexed, continued faithful. But the revolt had spread rapidly elsewhere, and British authority was almost extinct throughout the Bengal presidency. Everywhere the mutiny was attended with savage excesses — women were outraged, and Europeans, without distinction of age or sex, barbarously murdered. Sir Hugh Wheeler, at Cawnpur, was betrayed by Nana Sahib, maharajah of Bithur, who, after offering him his aid, took the mutineers into his pay, and raising the Mahratta standing, besieged him in Cawnpur. The siege, or rather bombardment, lasted from June 7 to 24, when a capitulation was agreed to, on a sworn promise of Nana Sahib to allow the garrison to retire to Allahabad. On the 27th the embarkation was proceeding when the boats were attacked by the Nana's troops, and the men indiscriminately massacred. The women and children were for the meantime made prisoners. Sir Henry Lawrence was besieged in Lucknow where he died on July 4, from a wound received in a sortie.

General Anson, the commander-in-chief, on learning the result of the mutiny at Meerut, hastened from the Simla Hills with all the troops he could muster to Delhi; but he was cut off by cholera on the way, at Karnál, May 27. Sir Harry Bernard, who succeeded him, effected a junction with the British troops from Meerut under General Wilson, who had already had a successful encounter with the enemy on June 7. On the 8th they carried the heights above Delhi. On the 9th they received a reinforcement from the Punjab. On the 12th they repelled an attack on their camp; but the force was still too small to attempt the capture of Delhi. The enemy in the meantime was continually receiving reinforcements and new and more formidable attacks on the British position were made on June 19 and 23, the latter the anniversary of Plassey. Before the last attack Sir John Lawrence had been able to send further reinforcements from the Punjab. By the end of June the British force before Delhi amounted to 6,000, and though still too weak to operate against the place was no longer in danger of being forced. Sir John Lawrence, who had rendered this effectual aid, had, by the assistance of the Sikh chiefs and by means of a movable column, put down all disaffection in the Punjab.

After protracted operations and repeated reinforcements on both sides Delhi was taken by assault, Sept. 14 to 20. Sir Henry Havelock, who had been engaged in the Persian campaign, had arrived in Calcutta on the 25th, and immediately set out for Allahabad, to commence operations for the relief of Lucknow and Cawnpur. While his force was victoriously advancing on Cawnpur, Nana Sahib on July 15, barbarously massacred his prisoners, consisting of 210 women and children. Havelock was succeeded in the command at Lucknow by Sir James Outram, who held it till relieved by Sir Colin Campbell (Nov. 17), who arrived at Calcutta on Aug. 14, and was followed by reinforcements from England. It had been at first apprehended that the mutiny might extend to the Bombay and Madras presidencies, and from this cause and the occupation of the troops in Bengal the mutineers had been left unchecked in Central India. At length columns organized in these presidencies entered Central India, and were united under Sir Hugh Rose. By the operations of these commanders the mutiny was finally suppressed. Among the distinguished officers who perished in it besides those named, were Generals Nicholson, Neill, and Havelock. The war was substantially closed by June, 1858, though the complete pacification of Oudh was not effected till the end of the year. The exasperated feelings caused by the savage conduct of the mutineers were perhaps too freely indulged in their punishment. Many were blown from the mouths of guns, a punishment several times before inflicted by the British in India, others expiated their crimes on the scaffold; but finally a royal proclamation offered an amnesty to all who had not committed crimes, declared that none should be favored or molested on account of religion, and declared the intention of her majesty in assuming the government of India to respect the rights, dignity, and honor of native princes as her own, and to promote the social advancement of India by internal peace and good government.

Indian Ocean, a body of water bounded on the W. by Africa, on the N. by Asia, on the E. by Australia and the Australasian Islands. According to modern geographers it is limited to the S. by the 40th parallel of S. latitude, in which region it opens widely into the Southern and Antarctic oceans. It gradually narrows toward the N., and is divided by the Indian peninsula into the Bay of Bengal on the E. and the Arabian Sea on the W., the latter sending N. two arms, the Persian Gulf and the Red Sea. Within these limits the Indian Ocean is estimated to have an area of 17,320,500 square miles.

At the dawn of history the Indian Ocean was known as the Erythræan Sea; the Phœnicians are said to have been familiar with this S. ocean at a very early date. Necho, an Egyptian monarch who flourished about 610 B. C., is reported by Herodotus to have sent some of his vessels, manned by Phœnicians, into the Erythræan Sea with orders to return by the S. of Africa and the Columns of Hercules. Whether or not this voyage ever took place, it appears certain, from their reports as to the position of the sun to the N. of them, that these early navigators penetrated far S. From a very early date there was a coasting trade between India and the Persian Gulf, but the voyage of Nearchus, one of Alexander's generals, from the Indus to the Persian Gulf, is the earliest reliable record of these coasts. Hippalus, an Egyptian navigator who flourished about the beginning of the Christian era, was the first to observe the regular alternations in the direction of the monsoons of the Indian Ocean, and to profit by them to open up a direct route across the high seas from the Red Sea to India. The shore routes were henceforth abandoned, and a fresh impulse was given to voyages into Oriental waters. In the 9th century the Arabs made frequent voyages across the Indian Ocean, Soleiman of Siraf being probably the first to cross the Bay of Bengal and pass into the China Sea. In 1486 the Portuguese rounded the Cape of Good Hope, and in 1498 Vasco da Gama reached the coasts of India by the same route. In 1521 the one remaining ship of Magellan's squadron crossed the Southern Indian Ocean in completing the first circumnavigation of the world.

The mean depth of the Indian Ocean is estimated at about 2,300 fathoms, or slightly greater than that of the Atlantic. The greatest depths are in the E. part to the S. of the equator, where it is estimated that there are fully 50,000 square miles with a depth of over 3,000 fathoms. Over 13,000,000 square miles of this ocean's floor lie between the depths of 2,000 and 3,000 fathoms.

The area of land draining into the Indian Ocean is estimated at 6,813,600 square miles, and the annual rainfall on this land is equal to 4,379 cubic miles of water. The rivers flowing from the Asiatic continent are by far the most important, and they carry an immense amount of detrital matter into the Bay of Bengal and Arabian Sea, these forming extensive deposits of blue mud. Along the African coasts, in depths from 100 to 1,000 fathoms, there are great deposits of glauconitic sands and muds, and on these as well as other coasts there are coral muds and sands, and blue and green muds in the shallower depths. In the deeper parts of the ocean, far from land, there are vast deposits of red clay, Radiolarian ooze, and Globigerina ooze. In the Southern Ocean, toward the Antarctic, the bed of the ocean is covered with a Diatom ooze.

The temperature of the surface waters of the Indian Ocean varies much in different parts of the ocean, and at the same place at different times of the year or states of the wind. In tropical regions the temperature usually varies from 70° to 80° F., and the yearly range is only 7° or 8° F. Off the Cape of Good Hope and off Cape Guardafui, however, the annual range of temperature may be from 20° to 30° F. For instance, sudden and great changes of temperature are often noticed off Cape Guardafui when the wind blows off shore, for in this way cold and deep water is drawn up along the African coast to take the place of the warm surface water which is driven E. by the wind.

The temperature of the water at the bottom of the Indian Ocean is very uniform and subject to little, if any, annual variation. In the Bay of Bengal and Arabian Sea temperatures of 33.7° F. and 34.2° F. have been recorded at the bottom; these are not more than the fraction of a degree higher than those observed by the "Challenger" in lat. 50° S. It is certain, therefore, that this deep cold water is slowly drawn into the Indian Ocean from the Antarctic to supply the place of the warm surface currents that are driven S. by the winds. The currents of the Indian Ocean are less constant than in the other great oceans, and are largely controlled by the direction and strength of the monsoons. Some of the most characteristic coral atolls and islands are to be found toward the central part of the Indian Ocean, such as the great Maldive group, the Chagos, Diego Garcia, and the Cocos Islands. Almost all the tropical shores are skirted by fringing and barrier reefs. Christmas Island is an upraised coral formation. St. Paul's, Mauritius, Rodriguez, and others are of volcanic origin, while Madagascar, Ceylon, and Socotra are typical continental islands.

Indian Red, a silicate of iron, imported from the Persian Gulf.

Indians, American, the original inhabitants of the Western hemisphere. The name Indian was bestowed by Columbus upon the copper-colored natives who greeted him when he first set foot on the soil of the New World, which he at that time supposed constituted a portion of India. The name has remained, and with the prefix "American" includes all the native races inhabiting the region from Mexico to the Arctic Ocean on the N., and to Terra del Fuego on the S.

Distribution.— The Esquimaux or Innuit,

the most N. of these tribes, extend across the continent along the Polar Sea. Next below them are the allied Kenai and Athabascan groups, the former represented chiefly by the Yellow Knife or Atna tribe on the Yukon river. The Athabascans are chiefly found between Hudson Bay and the Rocky Mountains, but include besides the Chippeways, Coppermine, Dogrib, and Beaver Indians; the Tlatskanai, Unkwa, and Hoopah Indians of the Oregon coast; the Navaho tribe of the Highlands of New Mexico; the Apaches, ranging from the W. Colorado to Chihuahua and Coahuila; and the Lipani, N. of the mouth of the Rio Grande del Norte. Canada and the United States E. of the Mississippi were formerly inhabited by the Algonquin-Lenappe and the Iroquois, generally at war with each other. The extreme W. of the Algonquin region was occupied by the Blackfeet Indians; the Ojibways held the shores of Lake Superior; S. and W. of Hudson Bay were the Crees. The Leni-Lenappe section of the Algonquin-Lenappe group comprised the five nations of the Delawares, including the Mohicans. The Iroquois included the Senecas, Cayugas, Onondagas, Oneidas, and Mohawks, who formed a league of five nations, afterward joined by the Tuscaroras. The Hurons were of the Iroquois group. The Dacotah or Sioux group occupied the plains between the Rocky Mountains and the Mississippi as far S. as Arkansas, and included the Assiniboins, Winnepegs, Iowas, Omahas, Osages, Kansas, Arkansas, Menitarees, Crows, and Mandans. W. of the Mississippi also were the Pawnees and Riccaras about the Nebraska or Platte river, and to the S. E. were the Choctaws and Chickasaws. In the Rocky Mountain regions were the Shoshone or Snake Indians, including the Comanches and others. The Cherokee tribes, which inhabited South and North Carolina, formed a detached group, and the Texas Indians were comprised in many small and diverse tribes. Below these, in New Mexico, a more advanced and distinct family is found called Moquis or Pueblo Indians. Of the numerous families occupying Mexico the Nahuatls or Aztecs were the most powerful and civilized. The Otomis, speaking a peculiar language, were also a numerous people in Mexico. In Central America the predominating family was the Maya, including the Quichés, Kachiquels, etc. Portions of the Aztec tribes were also found in Central America. In South America the leading and more advanced families were those that made up the Peruvian empire, among which the Inca race and the Aymaras were the chief. The Araucanians, to the S. of these, in Chile, had a considerable resemblance to the Algonquins and Iroquois of North America. The remaining portions of the continent, including the great alluvial tracts of the Atlantic slope, were principally occupied by the Guaranis; but along its N. coast were found the Caribs, who spread also over the Antilles and most of the West Indian Islands. In the extreme S. part of the continent live the tall Patagonians or Tehuelches, and squalid families in some respects resembling the more debased Australians.

Origin.— Speculation in regard to the origin of the American Indian has no limit; definite knowledge of his origin is an unknown quantity. By some, the tribes are considered an aboriginal and single stock, by others a mixture of Mongolian, Polynesian and Caucasian types, while still others claim that they are derived from the grafting of old-world races on a true American race. Laurence regards them as a distinct stock, differing from all others in physical, moral and intellectual characteristics, and, with all their differences, as one and the same, from Cape Horn to the Arctic regions. Morton (1839), considered the American nations, excepting the polar tribes, as of one race and one species, but of two great families which resemble each other in physical, but differ in intellectual character; the superior family, or Toltecan, including the semi-civilized nations of Mexico, Central America, New Grenada and Peru, and also the Mound Builders of the Mississippi valley. Much has also been written in support of the theory that these aborigines migrated from the old continent, many insisting that they must be descendants of 10 lost tribes of Israel, while, on the other hand, prominent authorities have suggested that the tide of emigration may have set the other way, from America to Asia. The Indians themselves have various traditions of their origin, the one accepted by many of the more intelligent tribes being that they sprung from caves or the bowels of the earth. With all the theories and arguments of learned men no definite conclusion ever has, or probably ever will be, reached. Of one thing, however, we are certain. The physical characteristics are the same everywhere, no matter what the tribe or locality. This resemblance, together with the remarkable diversity of language among them, is very suggestive of the great length of time these people have occupied America. To say nothing of languages which have become extinct without leaving any record we know of between 50 and 60 distinct linguistic stocks in North America, N. of Mexico, which appear to be as different from each other as the Semitic is from the Aryan or the Turanian. In the Algonquin family, for instance, the Ojibways, Blackfeet, Cheyennes and Arapahoes speak four different tongues, each unintelligible to the others. It must be conceded that it has taken a long time for these different languages to become developed. While varying widely

among themselves, the Indian languages and dialects exhibit no affinity to any other and form an absolutely distinct order of speech. The Indians of the S. and S. W. were, as the remains of extensive towns show, partly civilized, and had made considerable progress in sculpture and architecture. In the S. W. part of Colorado ruins of large cities can be found, whose stones are embedded in mortar at the present day. Fragments of pottery found in these localities show some artistic taste in their elaborate painting and ornamentation. Wicker-work, arrow heads, and spear heads are found in abundance. In the copper mines in the Northern peninsula are many evidences that the mines had been worked by Indians, their stone hammers being discovered in many of the excavations made by them, while it is known they possessed utensils made of copper, it being also one of their articles of commerce.

Physical Characteristics.— All the American Indians, savage or semi-civilized, possess the same characteristics. All have the same long, lank hair, black as a raven's wing, brown or copper-colored complexion varying to almost white, heavy brows, dull sleepy eyes, seldom expressing any emotion, full and compressed lips, salient and dilated nose. The head is square or rounded, flattened or vertical occiput, with high cheek bones. In demeanor the Indian is haughty, taciturn and stoical. He is cunning, brave and ferocious in war and the most dreaded of all enemies. In temperament he is poetic and imaginative, and many of the chiefs have been noted for their eloquence and the beauty of their diction.

Wars.— The early history of this country is full of accounts of wars with the savages who have always resisted to their utmost the encroachments of the "white faces." The most important of these conflicts were The Pequot War (1637); King Philip's War (1675); Wars of the Six Nations; Black Hawk War (1832); and the Seminole War (1835–1839).

Of the more recent conflicts with the red men, the Modoc war in 1872 was caused by an order from the government to remove the Modoc Indians from their lands on Lake Klamath, Ore., to a new reservation. They refused to go, resisted the United States troops sent to coerce them and retreated to the almost inaccessible "lava beds." It was not till June 1, 1873, that the United States troops under General Davis forced them to surrender. The Sioux war broke out in 1876. In 1890–1891, brief troubles again arose between the Sioux and the government and some severe fighting took place in South Dakota. In 1898 there was an uprising in Minnesota. It was suppressed without difficulty.

Population and Government.— The entire Indian population of the United States in 1880 was 256,127; in 1890, 243,524; in 1900, 270,544; in 1909, 300,121, according to the annual reports of the Commissioner of Indian Affairs. In the latter year the total area of Indian reservations was 77,446.61 square miles; the greatest area was in Arizona (30,554 square miles); and the largest population in Oklahoma (117,370). The Indians are governed by tribal legislatures and officials, supervised by the United States government, except where local agencies render this impracticable. The annual appropriation by Congress for the Indian service is now nearly $12,000,000. This sum is disbursed for current and continued expenses, treaty obligations, miscellaneous support and gratuities, the support of schools, payment for lands, interest on trust funds and incidental expenses. It costs about $2,000,000 a year to maintain the Indian schools and about $3,000,000 to fulfill the treaty obligations. One of the most pleasing and instructive features of the Trans-Mississippi Exposition, held at Omaha, Neb., in the summer of 1898, was the Indian Congress, held under the direction of the Indian Bureau and in charge of Capt. W. A. Mercer, U. S. A., assisted by Prof. James Mooney of the Bureau of Ethnology. The tribes represented were the Sioux, Omahas, Crows, Blackfeet, Apaches, Piutes, Zunis, Cheyennes, Navajoes, Moquis, Creeks, Cherokees, Seminoles, Comanches, Poncas, Winnebagoes, Sacs and Foxes, and Digger Umatillas.

Indian Shot. See CANNA.

Indian Summer, a period of mild summer weather which generally occurs toward the end of autumn in the United States.

Indian Territory. See OKLAHOMA.

Indian Tobacco. See LOBELIA.

Indian Yellow, or **Purree,** an orange-yellow pigment highly esteemed by painters. It has depth and permanence, and is used in both oil and water-color painting. See PURREE.

Indian Rubber. See CAOUTCHOUC.

Indican, in chemistry, $C_{26}H_{31}NO_{17}$, a clear brown syrup of bitter and repulsive taste, existing in many species of plants, but especially in Dyer's wood (*Isatis tinctoria*). It is extracted from the dried leaves with alcohol, the resulting greenish tincture being allowed to evaporate spontaneously. The residue is next treated with water, filtered, and the filtrate shaken with cupric hydrate, and again filtered. On the removal of the copper by means of sulphydric acid, the clear solution is found to contain almost pure indican. It is soluble in water, alcohol, and ether, and on boiling with dilute acids it is decomposed into indigo blue, indigo red, and indiglucin. It cannot be dried without decomposing.

Indicator, in chemistry, a reagent used in volumetric analysis to indicate, by change of color, the exact point at which the precipitation of any chemical body from a solution is completed. Thus, in estimating the amount of hydrochloric acid present in a solution, a standard solution of silver nitrate is used, but as it is difficult to determine the exact point at which the action is completed, a few drops of a solution of yellow potassic chromate, the indicator, are added. As soon as the hydrochloric acid is entirely precipitated as silver chloride, the silver nitrate attacks the indicator, producing a faint, blood-red tinge, an evidence that all the chlorine has entered into combination with the silver, and that the slight excess has formed the silver chromate. Indicators are also used to determine, by change of color, the precise point at which a liquid ceases to be either acid or alkaline. The chief reagents used as indicators are yellow potassic chromate, potassic ferrocyanide, indigo, carmine, litmus, turmeric, Porrier's orange, tropœolin, phenolphthalein, eosin, rosalic acid, etc.

Steam Engine.— An instrument for measuring the horse power of a steam engine. It consists of a small vertical cylinder having a piston kept down by a spring. The piston rod carries a pencil moving vertically across a card vibrated horizontally by the piston rod of the engine under measurement. Steam is admitted beneath the indicator piston from the cylinder of the engine measured, and the pencil marks on the card the varying steam pressure in the cylinder, whence the power of the engine may be computed.

Optics.—A finger working in the field of a microscope to point out a special object within the field of view.

Telegraphy.—The dial and mechanism of a dial telegraph. The face has the letters and figures arranged in two concentric circles. The motion of the hand is continuous in one direction advancing one letter at each closing of the circuit. The movement is effected by clockwork driving a scapewheel, the teeth of which are alternately engaged and released upon opening and closing the circuit, by means of a pawl operated intermediately from the armature of the electro-magnets.

Indicator Diagram, a diagram drawn on an indicator card by the pencil of the indicator of an engine at work. The object in view is to ascertain the relations between, and also the product of the varying pressure and the corresponding variations of volume of, the working substance — steam, explosive gas mixture, hot air, or other material. The latter, the variations of volume, are, in a cylinder, well represented by the movements of the piston; the former, the varying pressure, may be followed by making the steam, etc., press out the piston of a small side cylinder against the resistance of a spring. If a pencil be attached to this piston it will mark on a piece of paper or card held in contact with the point a straight line traced and retraced with varying velocity. If the steam be shut off from this side cylinder the pencil assumes the position of "no pressure." If now, on the other hand, the piston of the main cylinder be made to draw the paper or card past the pencil point in a direction at right angles to the former, the varying velocity with which a straight line is traced and retraced on the paper will reproduce the varying velocities of the main piston itself. If these two actions be now combined the pencil will move, say, up and down, while the paper will oscillate or be unrolled backward and forward. The pencil point will accordingly describe upon the paper an irregularly curved figure, which will, in uniform working, be a closed curve, and will always tend approximately to reproduce itself during each successive cycle of the engine. On the scales on which the linear traces of the pencil represent, in directions at right angles to one another, the variations of pressure and the piston movement respectively, the area enclosed by this curve will represent the work done by the engine during each cycle; and its form enables the actual pressures and volumes of the working substance to be traced out for each successive portion of the cycle, and thus enables the working of the engine to be carefully studied in detail.

Indicavit, in English ecclesiastical law, a writ of prohibition against proceeding in the spiritual court in certain cases, when the suit belongs to the common law courts. It lies for the patron of a church whose incumbent is sued in the spiritual court by another clergyman for tithes amounting to a fourth part of the profits of the advowson.

Indiction, a declaration or imposition of a tax, an impost, or a prohibition of grave character. The "Cycle of Indiction" is a period of 15 years, not founded on any astronomical occurrence, but fixed first by Constantine the Great as a fiscal arrangement. It began on Jan. 1, A. D. 313. The Popes adopted it in the year 1582, when the calendar was reformed, that year being the 10th of the indiction. The year of the indiction corresponding to any year of our era is thus found: Add 3 to the date, divide the sum by 15, and the remainder is the year of the indiction, the remainder 0 indicating the 15th of the cycle. Thus $\frac{1884 + 3}{15} = 125$, with a remainder of 12.

Twelve, therefore, is the indiction of that year. There are three other indictions besides Constantine's : the Cæsarean or Imperial, the Roman or Pontifical, and that of the Parliaments of France.

Indictment, in law, the act of indicting or charging a person with a crime or misdemeanor; the state of being indicted; a formal charge against a person or persons for a crime or misdemeanor. Also a written accusation of one or more persons of a crime or misdemeanor, preferred to and presented on oath by a grand jury. Properly, an indictment is not so called till it has been found a true bill by the grand jury, up to which time it is called a bill. If the grand jury are of the opinion that the evidence is not sufficient to support the charge, they indorse the bill "not found," or "ignoramus"; if the contrary, "a true bill."

Indies, the name given by Columbus to his first discoveries in America, which he thought at the time were a part of India. These lands were afterward termed the West Indies, which name the islands still bear.

Indies, East, a collective name vaguely applied to Hindustan, Farther India and the Indian Archipelago. See HINDUSTAN: INDIA.

Indies, West. See INDIES.

Indigestion, dyspepsia, difficulty of digestion, with slowness and long retention of the food in the stomach, great distress after eating, uneasiness at the pit of the stomach, fetid eructations, and unaltered ingesta in the stools. Digestion is much retarded, deficiency and abnormality of the gastric juice being a common occurrence. Gluttony, drunkenness, over-anxiety, and sedentary habits are the chief causes; the avoidance of these the remedy, with appropriate treatment to improve the character of the gastric juice. Heartburn or waterbrash is an unpleasant accompaniment. Indigestion is rather an abnormal functional difficulty owing to reflex action than a distinct disease. It is sometimes accompanied by nausea and vomiting.

Indigo, a vegetable dyestuff, yielding a beautiful and very durable blue dye. Many tropical and sub-tropical plants contain a substance, probably a glucoside, which, on being extracted and allowed to ferment, produces impure indigo. The plants from which it is chiefly obtained are the various species of *Indigofera*, *Isatis tinctoria*, *Polygonum tinctorium*, etc. In order to prepare indigo on a large scale, the leaves and stems of the respective plants are steeped in water till fermentation sets in, which occupies from 12 to 14 hours. The yellow-colored liquid is then drawn off into shallow vessels and exposed to the air for two or three hours when, in consequence of the oxidation of the indigo-white first formed, commercial indigo is deposited in the form of a sandy-looking powder. This latter is washed, boiled in water for two or three hours, filtered, and the residue pressed into cubical cakes and dried by heat. Commercial indigo is by no means pure indigo-blue; it contains indigo-gluten, indigo-brown, and indigo-red, together with insoluble impurities. Indigo prepared in Java by Sayer's process contains from 66 to 71 per cent. of indigo-blue, and only 2½ per cent. of ash, while ordinary commercial indigo seldom contains more than 65 per cent. of indigo-blue, with not less than 15 per cent. of ash. Indigo is tasteless, odorless, and of an intense blue color, passing into purple. It is insoluble in water, cold alcohol, and ether, slightly soluble in boiling alcohol, but very soluble in concentrated sulphuric acid.

Indigo Bird, a North American bird of the finch family, a native of the United States, as far N. as the Missouri, which it visits in summer, and of Central America, where it spends the winter. It is about 5½ inches in length, of a beautiful blue color, variously tinged and shaded. It frequents open places on the edges of woods, and has a very sweet song.

Indigo-brown, a dark-colored, transparent resin, extracted from indigo by boiling it in a solution of potassic hydrate. It is tasteless and quite neutral ,and unites both with acids and bases. It is of uncertain composition, but in many characters it resembles indihumin.

Indigo Copper, native sulphuret of copper occurring sometimes in hexagonal crystal but generally uncrystallized. It is of an indigo-blue color, and contains sulphur 33.5, copper 66.5. Sp. gr. 4.6. Found at Vesuvius on lava, at Algodon Bay, Bolivia, and in Chile. Called also covellite.

Indigo-green a green obtained from indigo by adding potash to an alcoholic solution of an alkaline hyposulphate of indigo.

Indigo-red, one of the coloring matters found in commercial indigo. It may be obtained by exhausting indigo with hydrochloric sulphuric acid then witn a strong caustic alkaline lye. After washing the residue with water, it is boiled with alcohol of a sp. gr. of 0.83. On distilling the alcoholic solution indigo-red is left as an amorphous dark-brown powder. It is insoluble in water and dilute acids, but soluble in strong alcohol, and in ether. Indigo-red may also be obtained from the fresh leaves of *Polygonum tinctorium*.

Indigo-white, in chemistry, $C_{16}H_{12}N_2O_2$, a white powder produced by the action of reducing agents on pure indigo-blue. It may be prepared by digesting for 24 hours

a mixture of indigotine, hydrate of calcium, sulphate of iron, and water in a closed flask filled with hydrogen. The clear solution is then decanted by means of a siphon filled with hydrogen into a vessel containing hydrochloric acid and ammonium sulphite. The precipitate of indigo-white which is formed is filtered and dried at 100°, in a stream of hydrogen. Pure indigo-white is a white powder with a silky luster. It is tasteless and inodorous, insoluble in water, but soluble in aqueous alkalies, in alcohol, and in ether. When indigo-white is dissolved in an alkaline liquid and the liquid over-saturated with hydrochloric acid, air being excluded, the precipitated white flocks slowly unite to crystalline scales, which oxidize with great rapidity to indigo-blue on being exposed to the air.

Indigo-yellow, a clear yellow substance, obtained by heating hypo-sulphindigotate of calcium with limewater in contact with air. It is soluble in water and in alcohol, but insoluble in ether. When heated it swells up and emits an odor resembling burnt animal matter. The yellow aqueous solution is completely precipitated by basic acetate of lead.

Indigotin, in chemistry, $C_{16}H_5NO_2$ (Indigo-blue), the pure blue coloring matter of indigo. It is obtained from commercial indigo, by reducing it to indigo-white, by means of reducing agents, such as ferrous salts, grape sugar, etc., the resulting yellow solution of the indigo-white metallic compound, on exposure to the air, depositing indigo-blue in small crystals. It may also be obtained synthetically, by heating a mixture of isatine with phosphorous trichloride, phosphorous- and chlor-acetyl, in sealed tubes, at 70° to 80° for several hours. On pouring the product into water, blue flocks of indigotine separate. It is a deep-blue, crystalline substance, with metallic luster, insoluble in water, alcohol, and ether. On heating to 300°, it is converted into a purple-red vapor, which condenses again to crystals of pure indigotine. By dry distillation with solid potassic hydrate it yields aniline. Indigotine is isomeric with cyanide of benzoyl.

Indirect Claims, pleas for damages indirectly done. After the American Civil War claims were made by the United States upon Great Britain for compensation for the damages, direct and indirect, done by the "Alabama" and other Confederate cruisers to the American marine. The Arbitration Committee chosen to decide on these demands disallowed the indirect claims as being contrary to international law.

Indiretin (in-dir'rit-in), in chemistry, $C_{18}H_{17}NO_5$, a dark-brown shining resin, produced, together with other bodies, by heating indican with dilute sulphuric acid. It is soluble in alcohol and in the aqueous alkalies and is precipitated from its ammoniacal solution by barium, calcium, and silver salts. When heated it melts, burns with a smoky flame, and leaves charcoal.

Indirubin (in-dir-ūb'in), in chemistry, C_8H_5NO, a crystalline compound, obtained by the decomposition of indican by means of an acid, but more abundantly by treating Indian wood leaves in an alkaline solution of stannous chloride, the liquid depositing indirubin on exposure to the air. It is insoluble in water and in aqueous alkalies, but soluble in alcohol. It crystallizes in metallic glistening needles, which appear red by transmitted light. It is insoluble in dilute sulphuric acid, even on boiling, but dissolves readily in concentrated sulphuric acid. Indirubin is isomeric with indigo-blue, and resembles indigo-root in many of its properties.

Indium, a very rare metal, occurring in minute quantities in zinc ores. It was discovered by F. Reich and Th. Richter, in 1863, in the zinc-blende of Freiburg. The metal itself is of a lead-gray color, soft, malleable, fusible, but not very volatile. It resists oxidation up to a temperature beyond its melting point, 176°, but when heated to redness takes fire in the air, burning with a blue flame, and giving off a brownish smoke. It is readily attacked by nitric acid, but dissolves slowly in hydrochloric and sulphuric acids. From the solution of its salts indium is precipitated by ammonia and potash as a hydrate, insoluble in excess of either reagent. It is also completely precipitated from neutral solutions of its salts by sulphuretted hydrogen. Indium oxide, In_2O_3, is a pale yellow powder, becoming darker when heated. The sulphide is an orange yellow powder, insoluble in acetic acid, but soluble in the mineral acids. Indium chloride, $InCl_3$, is volatilized at a red heat, but undergoes decomposition when heated in the air. All the salts of indium impart a violet tint to the flame of a Bunsen burner. The spectrum of the metal is very characteristic, consisting of two bright indigo-colored bands, and it was the production of these bands which led to the discovery of the metal. Its sp. gr. is 7.421 at 16.8°.

Indo-China. See INDIA.

Indo-European Languages. See ARYAN LANGUAGES.

Indophenols, a name given to a class of blue coloring matters, used in dyeing, obtained by the action of nitroso-derivatives of tertiary aromatic amines or phenols on alkaline solutions of phenols at the ordinary, or at a raised temperature.

Indore, a Mahratta principality of India, comprising the territories of the Holkar

dynasty, and consisting of several detached tracts, covers an area of 8,400 square miles. The bulk of it lies between Sindhia's dominions on the N. and Bombay Presidency on the S., its length from N. to S. being 120 miles, and its breadth 82. It is traversed from E. to W. by the Nerbudda, which almost bisects it; by the Vindhya Mountains, their loftiest point within its limits being 2,500 feet above the sea; and by the Satpura Mountains. Principal products, poppy, cotton, tobacco, wheat, rice, millets, etc.; principal industries, cotton and opium manufacture. Pop. (1891) 1,141,184. The Vindhyas and Satpuras have from time immemorial been the home of the Bhils, the wildest of the aboriginal tribes in India. The Holkar State railway connects the Rajputana railway system with that of Bombay. The climate is sultry, the thermometer ranging from 60° to 90° F. in the shade. The State was founded about the middle of the 18th century by Malhar Rao, a soldier of fortune, who served the Peshwa. In 1818 the ruler of the Holkar dominions was reduced to the position of a feudatory prince of the British Indian empire. He maintains an army of 8,900 men.

Indore, the capital of the Maharaja Holkar's dominions. Pop. (1901) 86,686, mostly Hindus. During the revolt of 1857, though the maharaja remained faithful to the British government, his troops mutinied in July, holding their prince a prisoner in his own palace, and butchering many Europeans in cold blood. The town dates only from 1770. Close to the town is the district specially set apart for the residence of the Governor-General of India's agent for Central India. Within this district stands a celebrated European hospital.

Indra, a Hindu deity worshiped in the Vedic period, but popular also in the Epic and Purânic periods. He is sometimes represented with four arms and hands, with two of which he holds a lance, the third wields a thunderbolt, and the fourth is empty; at other times as a white man sitting on an elephant, having a thunderbolt in his right hand, and a bow in his left. When painted, he is covered with eyes. As the god of the hundred sacrifices he is jealous of every mortal who attempts to equal him in this respect, for the sacrificer would rise to a rank as high as his own. Hence he is ever ready to disturb sacrificial acts by sending one of the celestial nymphs to draw away the minds of the devotees from their religious observances, and induce them to return to a life of sensual gratification. In the most ancient of the Rig Veda hymns the character of Indra is that of a mighty ruler of the bright firmament, who conquers Vritra, the symbol of the cloud obstructing the clearness of the sky and withholding the fertilizing rain from the earth. He is at once beneficent as giving rain and shade, and awful and powerful as in the storm. In the earliest ages he rose to the sovereignty among the gods; but in the Purânic period his star gradually declines and he is no longer the principal divinity, but only the chief of the inferior deities. The gradual expansion of his mythical character arose from his being regarded as the protector of the pious and virtuous; and his ultimate degradation to a subordinate position in the Hindu pantheon was the result of his being conceived as essentially a warlike god, not only powerful, but self-willed. A curse from the sage Durvâsa causes his power and that of his subject deities to decline, and he suffers defeat from Krishna in a fight for the Pârijâta tree, which had been planted by Indra in his own garden. The eyes with which he is represented as being covered were originally 1,000 marks of disgrace pronounced on him as a curse by the sage Gautâma. The bow which he bends for the destruction of his foes is the rainbow. The attributes chiefly ascribed to him are those of physical superiority, and of dominion over the external world, while spiritual elevation and moral grandeur are not prominently characteristic of him. The Rig Veda abounds in allusions to the elemental conflicts of which Indra is the author. A more pleasing aspect of this deity is that of lord of Swarga, the beautiful paradise where the inferior gods and pious men who during their life on earth have faithfully discharged their religious duties, dwell in full and uninterrupted felicity, and enjoy those delights of the senses which in anticipation exercise so powerful an influence on the Eastern imagination.

Indre (*ang'*dr), a department of France, lying S. of the department of Loir-et-Cher; area, 2,679 square miles. It is watered by the Indre, the Creuse, and its tributary, the Anglin. The surface is generally flat, and the land fertile, producing large crops of wheat and barley. The two principal resources of the department, however, are its vineyards and its flocks. Chief towns: Châteauroux, the capital, Le Blanc, Issoudun, and La Châtre. Pop. (1906) 290,-216.

Indre-et-Loire (*ang*-drāl-wär'), a department of France, lying N. W. of the department of Indre. It is watered by the Loire, and by its tributaries, the Cher, the Indre, and the Vienne, all of them navigable. In the Indre-et-Loire the surface is hilly, and either watered or wooded, but in the other parts it is generally flat, and very fertile. Of the products, which include an abundant yield of the ordinary bread stuffs, wine is the most important. Chief towns: Tours, the capital, Chinon, and Loches. Pop. (1906) 337,916.

Induced Currents, electric currents developed in conductors in proximity to other conductors traversed by intermittent or fluctuating currents; also, electric currents developed in conductors moving in the field of a magnet, or in conductors within the field of a moving magnet.

Induction, the act of inducting or bringing in; introduction; a bringing in or putting into an office.

In electricity, the action which electrified bodies exert at a distance on bodies in a natural state. An insulated conductor, charged with either kind of electricity, so acts on bodies in a natural state placed near it as to decompose the neutral fluid, attracting the opposite kind of electricity, and repelling the same kind.

In logic and philosophy, Whately (Logic, bk. iv., ch. i., §1) notes the ambiguity of this word, it being employed (a) to designate the process of investigation and collecting facts; and (b) the deducing of an inference from those facts. It is also loosely used in the sense of an inference from observed facts.

"Induction, then, is that operation of the mind, by which we infer that what we know to be true in a particular case or cases, will be true in all cases which resemble the former in certain assignable respects. In other words, induction is the process by which we conclude that what is true of certain individuals of a class is true of the whole class, or that what is true at certain times will be true in similar circumstances at all times. This definition excludes from the meaning of the term induction various logical operations, to which it is not unusual to apply that name."—J. S. Mill, "Logic," bk. iii., ch. ii., § 2.

In magnetism, the action which magnetized bodies exert at a distance on bodies in a natural state.

In natural science, a consequence, inference, or general principle drawn from a number of particular facts or phenomena. As Whewell says the inductive philosophy ascends from particular facts to general principles, and then descends again from these general principles to particular applications.

Coefficient of magnetic induction is a coefficient expressing the ratio of the intensity of the induced magnetization to the intensity of the field.

Induction Balance, a modification of the microphone. Its object is to measure the differences in the molecular constitution of metallic bodies. A milligram of copper on an iron wire finer than the human hair has been detected, and its exact value ascertained, by this delicate instrument. Two gold coins of exactly equal weight and value being placed on opposite sides of the instrument will occasion no disturbance, but if one of them weighs more or less than the other in the slightest degree, or if there be the least difference in the alloy, the fact is at once made known. The difference of temperature in a coin caused by breathing on it or holding it for an instant between the fingers has been detected. This instrument has been applied to medical uses. In its present form it consists of two flat coils, about 4 inches in diameter and ½ inch in thickness, of insulated copper wire, battery, condenser, circuit, and telephone.

Induction Coil, in electrical machinery, a contrivance which consists essentially of two separate coils of insulated wire wound round a soft iron core. The following are the dimensions of a coil, reputed to be the largest in the world. It has two primary circuits and two cores, the inner one being a bundle of insulated soft iron wires, 44 inches long and 3½ inches in diameter, round which are wound 660 yards of covered copper wire, weighing 55 pounds. The second core is a cylinder formed of similar wires to the first, and is 3.8 inches in thickness, surrounded by 504 yards of wire, weighing 84 pounds. The secondary coil is 280 miles long, wound in four sections of about 200 layers each, the two outer sections having slightly thicker wire than the others. The total resistance of the secondary coil is about 110,200 ohms. This instrument gives with thirty quart Grove cells, a spark in air 42 inches in length.

Indulgence, in Roman Catholic theology, a remission of the punishment which is still due to sin after sacramental absolution, the remission being valid in the court of conscience and before God, and being made by an application of the treasure of the Church on the part of a lawful superior. Indulgence may be either (1) Plenary, remitting the whole, or (2) Partial, remitting a portion of the temporal punishment due to sin. The former are granted by the Pope to the whole Church; the latter by primates, metropolitans, and bishops within their respective jurisdiction. The Council of Trent ordains that indulgences must be given everywhere gratis.

Canonical penances in the early Church were very severe, and, in times of persecution, it was the custom of martyrs awaiting death to give weaker brethren, who had lapsed or been guilty of other grievous sin, a letter (*libellus pacis*) to the bishop, asking that he might be restored. From the 7th century to the Crusades indulgences were granted in the form of commutation; almsgiving to the poor, to monasteries, or to churches, and pilgrimages, being substituted for so many years, months, or days of canonical penance. It is a common idea that in the Middle Ages the power attributed to indulgences was extended from canonical penance to purgatory; but Roman theologians quote Cyprian to show that in the 3rd century the belief existed that indulgences satisfied not only the rigors of ecclesiastical penance, but the justice of God.

Urban II. granted plenary indulgence in the Council of Clermont to those who should go at their own expense on the then contemplated Crusade. In the 9th century Pascal I. and John VIII. bestowed indulgences on the souls of those who had died fighting for the Church; and Sixtus V., in his Constitution (Nov. 27, 1477), lays down that such indulgences are only granted "by way of suffrage." At first such indulgences were issued sparingly, but, after a time, they were granted in numbers and for comparatively unimportant objects. In 1300 they were sold over Europe in connection with the Jubilee. Early in the 16th century they were farmed out, the farmers employing agents to retail them to the people at a profit. These subordinates puffed their wares without much attention to theological precision. One of these, John Tetzel, a Dominican friar, so filled Luther with indignation as to lead him, on Oct. 31, 1517, to affix theses on that and cognate subjects to the door of the Cathedral Church of Wittenberg and thus commence the Reformation.

Indulgence, Declaration of, the proclamation of James II., of England, in 1687, by which he promised to suspend all laws which tended to force the consciences of his subjects. His real aim was, of course, merely to relieve the Roman Catholics; hence the declaration was very unpopular, and the refusal of the Seven Bishops to command their clergy to read it from their pulpits was but the culminating point of universal public dissatisfaction. Two similar indulgences in English history were those issued by Charles II. in 1662 and 1672, both of which were equally unpleasing to the dissenters alike in England and Scotland, who declined to share their toleration with their Roman Catholic fellow-subjects.

Indulin, a term applied commercially to a series of aniline colors, obtained by treating the bases of magenta refuse with aniline and acetic acid. The magenta refuse is first thoroughly freed from the salts of mauvaniline, rosaniline, and chrysaniline by means of boiling water acidulated with hydrochloric acid. The undissolved violaniline is then mixed with acetic acid and aniline, and heated to between 140° and 160°, until the mass dissolves and gives the desired shade in alcohol acidulated with acetic acid. There are two kinds of indulin, the one soluble in alcohol, the other in water. Spirit-soluble indulin dyes wool, silk, and cotton different shades of blue or gray. The water-soluble indulins dye fabrics light and dark shades of gray, even approaching black; but the blacks are not satisfactory either in color or durability.

Indus, one of the great rivers of Asia, which rises in Tibet, on the N. of the mountain Kaims, celebrated in the mythology of the Hindus. After passing the city of Lahdack, in Tibet, it takes a S. W. course, and forcing its way through the mountains called the Hindu Kush enters Hindustan in about lat. 35° N. Its course is generally to the S. Below its confluence with the Punjnud, the Indus, instead of increasing in volume, becomes gradually less. Its basin is here narrow, so that the affluents are insignificant, while its arid, sandy nature causes the river to suffer from absorption and evaporation. This operates still more powerfully from the circumstance that the river here divides into numerous channels, many of which never return at all to the main stream, while others return much shrunken in volume. This wasting of the waters is, however, not very apparent to the eye, owing to the gradual slackening of the current, and the ascent of the tides. At Migani, 8 miles N. of Haidarabad, commences the Delta proper, which measures 75 miles upward, by 130 along the coast of the Arabian Sea. The area of the drainage — its extreme dimensions being respectively 900 miles and 750 — has perhaps been over-estimated at 488,000 square miles. The value of the Indus as a route of traffic is less than that of most other streams of equal magnitude. In the winter, one only of its numerous outlets is at all available for communication with the sea; and even after the melting of the spring snows, there is no passage anywhere for an ordinary sea-going vessel of more than 50 tons. Still, in another respect, the river is favorable for navigation, as the fall from Atak to the sea is only 1,000 feet in 940 miles. The Indus abounds with fish of excellent quality, and is infested by crocodiles. The alluvium brought down by the stream has been calculated to be sufficient for an annual formation 42 miles long, 27 miles broad, and 40 feet deep.

Indus, in astronomy, a constellation of the Southern Hemisphere. It lies to the south of Sagittarius, being between that constellation and the South pole. It was formed and named by Bayer. Its largest star is one of the third magnitude.

Industrial and Provident Societies, societies that carry on some trade for the mutual benefit of the members. In Great Britain various acts have been passed for the regulation of industrial societies, the most important being in 1876, amending and consolidating all previous acts. The societies which may be registered under this act are societies for carrying on any labor, trade, or handicraft, whether wholesale or retail, of which societies no member other than a society registered under this act shall have or claim an interest in the funds over $1,000. No society can be registered which has a membership of less than seven

persons; and every society must have a registered office; must publish its name outside the office and elsewhere; must submit its accounts to an annual public audit; must send annual returns to the registrar, etc. A register of the members' names must be properly kept. The registrar, on application of one-fifth of the members, may, with the consent of the treasury, appoint one or more inspectors to examine into the affairs of the society and report thereon.

Industrial Schools, a term used very variously, sometimes designating ordinary elementary schools, in which agricultural or some other industrial art is taught to boys during one portion of the school day, or in which sewing, cooking, washing, and ironing are taught to girls.

Industrious, The, a designation, in mediæval days, of Lucca, in Italy.

Inebriates. See TEMPERANCE MOVEMENT.

Inertia (in-er'shē-ä), the incapability of matter to change its state, whether that be one of motion or rest. If in motion, it will continue so forever unless some counteractive force, like that of gravity, act upon it. If at rest, it will ever remain so unless a counteractive impulse set it in motion. The resistance which, especially at first, it gives to such a force operating to move it is called *vis inertiæ* = the power of inertia.

Inertia, Center of. See CENTER.

Inexhaustible Bottle, a trick bottle employed by conjurers in their performances, and by means of which they profess to be able to supply any beverage called for by the audience. The inexhaustible bottle is opaque, usually of iron or gutta-percha, and contains several small phials communicating with the exterior atmosphere by pipes which can be readily stopped by the fingers. Small pipes also pass from the phials to the neck of the bottle. A different kind of liquor is put into each phial, and any particular kind can be poured out at will by removing the finger from the orifice of the pipe, admitting air to the phial in which the liquor is contained.

Infallibility, a quality or state of freedom or exemption from error.

Papal infallibility, a claim asserted on July 18, 1870, in the Œcumenical Council, held in the Vatican under the presidency of Pope Piux IX.:

"We teach and define that it is a dogma divinely revealed; that the Roman pontiff, when he speaks *ex cathedrâ*, that is, when in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme apostolic auhority he defines a doctrine regarding faith or morals to be held by the Universal Church, by the divine assistance promised to him in blessed Peter, is possessed of that infallibility with which the divine Redeemer willed that His Church should be endowed for defining doctrine regarding faith or morals; and that therefore such definitions of the Roman pontiff are irreformable (*i. e.*, in the words used by Pope Nicholas I., Note 13, and in the Synod of Quedlinburg, A. D. 1085, 'it is allowed to none to revise its judgment, and to sit in judgment upon what it has judged' (Labbe, vol. xii, p. 679), of themselves and not from the consent of the Church. But if any one — which may God avert — presume to contradict this our definition, let him be anathema." (Vaughan: "The Vatican Council," pt. ii, p. 119.)

Till the decision of the Vatican Council in favor of the Pope's infallibility this opinion, though for centuries it had had numerous advocates, especially in Italy, had never been authoritatively decided. When it ceased to be an open question, some German bishops, of whom Professor Döllinger, of Munich, was the most noted, seceded from the Roman Church, and in September, 1871, took the name of Old Catholics.

Infant, in law, a person under the age of 21 years.

"Infants have various privileges, and various disabilities; but their very disabilities are privileges, in order to secure them from hurting themselves by their own improvident acts. An infant cannot be sued but under the protection, and joining the name, of his guardian, for he is to defend him against all attacks as well by law as otherwise; but he may sue either by his guardian, or by his prochein amy, or alone for wages in the county courts. In criminal cases an infant of the age of 14 years may be capitally punished, but under the age of 7 he cannot. The period between 7 and 14 is subject to much uncertainty; for the infant shall, generally speaking, be judged *prima facie* innocent; yet if he was *doli capax*, and could discern between good and evil at the time of the offense committed, he may be convicted, and undergo judgment and execution of death, though he has not attained to years of puberty or discretion." —Blackstone.

Infanta, a title given to princesses of the Spanish and Portuguese "blood royal," other than the eldest daughter when heiress apparent to the throne; as, the Infanta Doña Luisa.

Infanta Maria Teresa, The, a Spanish battleship, one of Admiral Cervera's fleet; captured in the fight at Santiago de Cuba in 1898 while attempting to run the blockade. She was a steel, barbette, armored cruiser; 7,000 tons displacement; length, 340 feet; breadth, 65 feet; maximum draft, 21 feet, 6 inches; horse power, 13,758; armor belt, 12 inch; gun positions, 10½ inches; deck plating, 3 inch; batteries, two 11-inch, ten 5.5 inch (all Hontoria guns), eight 2.2 inch rapid-fire, eight 11.4 inch, and two muzzle-loading rifled guns; 6 torpedo tubes; speed, 20.25 knots; officers and crew, 500; cost, $600,000. She was sent to Nor-

folk, Va., for repairs and was wrecked on Cat Island during a storm.

Infante, the title given in Spain and Portugal to the princes of the royal family, the corresponding title of Infanta being given to the princesses. Since 1388, however, the heir apparent to the throne in Spain has been styled the Prince of Asturias, and the heir apparent in Portugal, till the separation of Brazil from the mother country, bore the title of Prince of Brazil. The personal domain of an Infante or Infanta is called the "Infantado."

Infanticide, the murder of an infant born alive; the killing of a young or newly-born child. The practice of destroying a portion of the offspring — in the majority of cases, the female children — among certain nations or tribes, appeared in the earliest times, and still lingers among some undeveloped races. Marshall defines it as "an artifice for restricting the expansive capacities of the race." J. F. McLennan, speaking of the struggles of primitive man, says there is no doubt that the origin of infanticide "is everywhere referable to that early time," and that it "led at once to polyandry within the tribe, and the capturing of women from without." Lubbock thus accounts for female infanticide: "Girls ate, and did not hunt. They weakened their mothers when young, and when grown up were a temptation to surrounding tribes"; but declines to accept the practice "as the true cause of exogamy." Darwin says: "The trouble experienced by the women in rearing children, their consequent loss of beauty, the higher estimation set on them when few, and their happier fate, are assigned by the women themselves, and by various observers, as additional motives for infanticide." In Sparta it was used as one means of securing what Spencer calls the "survival of the fittest," and was defended by Plato and Aristotle. Allusions to exposure of children in Roman times occur in Plautus, Terence, Ovid, Juvenal, and Tacitus. St. Augustine says the Romans had a goddess Levana, so called "*quia levat infantes.*" Lubbock and Gerland are two of the best authorities on the subject, and contain excellent bibliographies and exact references.

The murder by high caste Rajpoots in India of their female children, once most extensive, arose from pride of caste. Public opinion requiring the father to expend an extravagant sum on his daughter's marriage and dowry if she lived, he considered it more economic to have her put to death in infancy. Major Walker induced them to give up the unnatural practice, but on his return to Europe it revived. To British remonstrance the answer was, "Pay our daughters' marriage portions, and they shall live." The government took a different method — it imposed on a father sanctioning the murder of his infant child an enormous fine, and the practice soon ceased.

Till lately some of the aboriginal tribes, especially the Khoonds, sacrificed children as votive offerings to the Earth-goddess. The Anglo-Indian government was for a long time unable to put down the practice, but the persistent kidnaping of native children from British-Indian soil, having furnished a *casus belli,* war was declared against the Khoonds, who by the treaty of peace were required to give up female infanticide. Prior to 1822 female infanticide, arising apparently through the pressure of population on the means of subsistence, existed among the Todas of the Neelgherry Hills.

Infantry, foot soldiers armed with rifle and bayonet. In Europe the infantry is divided into infantry of the line, light infantry, and rifles; but practically no distinction, except that the latter have a lower standard, now exists between them. Formerly the flank companies of each line battalion were, respectively, "grenadier" and "light" companies, and the deployment of the lines or the advance of the columns in battle were either covered by these companies, or by separate light infantry regiments, which were extended as skirmishers. These were either called in when the masses of troops advanced, or, halting, let them pass through. They only prepared the way for the main attack. With the introduction of long range fire, the attack by lines or colums became too dangerous; the former from their slowness, the latter from their denseness. The infantry could no longer advance covered by a weak screen of skirmishers. Battalions, therefore, formed for attack with two companies firing, two supporting, and four in local reserve, the whole working on a narrow front; and, finally, the company in Germany, and the double company in England, formed the fighting tactical unit, and was distributed in a similar manner. But the skirmishers no longer merely cover the advance of troops in rear. They form the fighting-line themselves, and reinforced as loss occurs, and strengthened finally by the local reserve, they break down the defense first with preponderating fire, and then with the bayonet. Ancient nations largely depended in battle on their infantry. Then foot soldiers became less employed, the use of cavalry being one feature of the age of chivalry. The formation by Louis VI., of France (1108–1137), of the communal militia, followed by similar action on the part of Frederick I., the Emperor of Germany (1152-1190), and Henry II., of England (1154–1189), again brought infantry into note.

Infant Schools, a means of educating very young children. Oberlin may be re-

garded as the founder of infant schools. He appointed women in his own parish to assemble the little children between the ages of 2 and 6, to interest them by conversation, pictures, and maps, and to teach them to read and to sew. The education and training of young children were matters of great interest and study to Pestalozzi. The most successful system of educating quite young children is the KINDERGARTEN (*q. v.*).

Infanzonado (ēn-fan-thō-nä′dō), a region in Spain, once the particular province of the younger princes of the royal family. It is now divided into five governmental jurisdictions.

Infection, a term which has been vaguely used for the contamination of the human body by morbific particles, whether there has or has not been contact with a person similarly affected, but more specifically applied to the contamination of the atmosphere or water by such agency, and through them of the human body. Marshes with decaying animal or vegetable matter send forth miasma when they begin to dry; emanations from putrid substances, etc., where human beings are unduly crowded, poison the atmosphere, and through it bring on inflammatory and other diseases. When the morbific matter has been absorbed, there follows a period of incubation. The best counteractive is an abundant supply of fresh air. There are also various disinfectants.

Infeftment, a Scotch law term, used to denote the symbolical giving possession of land, which was the completion of the title, the mere conveyance not being enough.

Inferior Planet a planet whose orbit lies within that of the earth. Mercury and Venus are the inferior planets.

Infernal, pertaining to the lower regions or regions of the dead, the Hades or Tartarus of the ancients.

Infernal Machine, an apparatus filled with gunpowder or other explosive materials for the destruction of human life and property. The Italian engineer Federico Gianibelli was the first to employ these engines at the siege of Antwerp in 1584–1585. In modern times, infernal machines have been repeatedly used, especially in France, for the purpose of assassination. The most notorious instances of this kind are the attempts made on the lives of Napoleon I., Dec. 24, 1800; Louis Philippe, July 28, 1835; and Napoleon III. and his empress, Jan. 14, 1858. See ANARCHISM.

Inferobranchiata, or **Inferobranchia** (in-fer-ō-brank-ē-ā′tä), a name for Cuvier's third order of *Gasteropoda*. They have, he says, nearly the same form and organization as *Doris* and *Tritonia*, but their gills, instead of being on their back, resemble two long series of leaves situated on the two sides of the body under the projecting margin of the mantle. He places under the *Inferobranchiata* the genera *Phyllidia* and *Diphyllidia*. S. P. Woodward included the *Inferobranchiata* in *Tectibranchiata*.

Infidel, from the Christian standpoint, one who does not believe in the Christian faith. It includes heathens, etc. It is founded on II Cor. vi: 15 and I Tim. v: 8. The Greek word is *apistos* = (1) passive, not to be trusted, (2) active, not trusting, not believing. One who does not believe that Christianity or any other religion has been divinely revealed, though such evidence as exists on the subject has been laid before him, is styled an infidel. The "infidel" may be a Deist, believing in a God, or an Atheist, denying or at least seriously doubting his existence; or an Agnostic, considering that he has not sufficient evidence to form an opinion on the subject. But in this second sense a Jew, a Mohammedan, a Brahmanist, a Buddhist, or a Polynesian idolater is not regarded as an infidel. He may have had no opportunity of judging respecting Christianity, and thus cannot have deliberately rejected it.

From the standpoint of the Mohammedan or other non-Christian faiths, an infidel is one who does not believe in the religion of the person using the term "infidel."

Infinite, not finite; having no bounds or limits; without limit; unbounded; boundless; not limited or circumscribed; applied to time, space, the Supreme Being or His attributes; as, The goodness of God is infinite. In music, a term applied to certain forms of the canon, because they could be played forever, inasmuch as the ending leads to the beginning; called also perpetual canon.

Infinitesimal, in mathematics, a quantity less or smaller than any assignable quantity; a quantity so small as not to be comparable with any finite quantity. Infinitesimals are of different orders. No quantity is great or small except in comparison with some other quantity. An infinitely small quantity of the first order is one that is infinitely small with respect to a finite quantity, that is, so small that it may be contained in it an infinite number of times. An infinitely small quantity of the second order is one that is infinitely small with respect to an infinitely small quantity of the first order. In general, an infinitely small quantity of nth order is one which is infinitely small with respect to an infinitely small quantity of the $(n-1)$th order. When several quantities, either finite or infinitesimal, are connected by the signs plus or minus, all except those of the lowest order may be neglected without affecting the value of the expression.

Inflammation, a morbid state of the whole or any part of the system, characterized by heat, redness, and pain, owing to a stoppage of function in the microscopic elements of the involved tissues, or to changes in the blood-vessels and blood, and exudation of *liquor sanguinis*, with permeation of white blood corpuscles, without rupture of the vessels, into the continguous parts, or to altered nutrition of the tissue, so that inflammation is an extremely complex process with excessive exudation, terminating favorably in resolution, when the abnormal process ceases and recovery ensues, or going on to various degrees of ulceration and suppuration, induration, and mortification. The varieties are — parenchymatous, exudatory or secretory, plastic, rheumatic, gouty, gonorrhœal, and others not so strictly defined.

Inflorescence, the arrangement of flowers upon a branch or stem. It may be axillary or terminal. In the former case the branch can grow indefinitely, producing new flowers on the axils, hence this is called an indefinite inflorescence; in the latter the terminal flower stops the further development of the branch, hence this kind of inflorescence is called definite. Inflorescence may be centripetal or centrifugal. Different kinds of inflorescence are (1) the spike, (2) the raceme, (3) the corymb, (4) the umbel, (5) the panicle, (6) the thyrsus, (7) the compound corymb and compound umbel, (8) the cyme. No. (1) is subdivided into —(a) the spike proper, (b) the ament or catkin, (c) the spadix, (d) the spikelet, (e) the cone, (f) the capitulum, and (g) the cœnanthium. Inflorescence is called also anthotaxis. (See all these terms.)

Influenza (in-flö-en'zä), a specific catarrhal inflammation of the mucous membranes of the air-passages, contagious, and often epidemic, attended with early involvement of chill, lassitude, and prostration to a marked degree, intense frontal headache, giddiness, and acrid discharge from the nose, with sleepless nights, and sometimes delirium. Persistent cough, worst at nights, expectoration, remittent feverishness, with nocturnal exacerbations, lasting from four to eight days, sometimes complicated with bronchitis or even pneumonia. Everything tending to depress the spirits must be avoided. This specific disease-poison in some epidemics is said to be as fatal as cholera, and has been occasionally mistaken for typhoid fever.

In forma pauperis, "as a poor man." When a person has just cause of suit, but is too poor to support the charges of an action, he is allowed, on making oath that he is not worth $25, besides his wearing apparel and the matter involved in the action to sue *in forma pauperis* — *i. e.*, without paying fees of court, counsel, or solicitor.

Information, in criminal law, a substitute for an ordinary indictment filed by the prosecuting attorney in certain cases of misdemeanor. Also, a written statement or declaration made usually on oath before a magistrate, previous to the issuing of a summons or warrant against a person charged with a crime, or an offense punishable summarily.

Infralapsarian, a name for a Calvinist who held that God having permitted, but not foreordained, the fall, then decreed the salvation of the elect by means of a Redeemer. He was thus not in any way responsible for the introduction of evil into the world; what He did was to provide the remedy. The Infralapsarians were opposed by the Supralapsarians. The question was debated chiefly in the early part of the 17th century.

Infula, in ancient Rome, a sacred fillet, made of wool, and worn on the head by priests, victims, and persons who fled to any place for mercy or protection. It was also worn by the emperors and magistrates on solemn occasions. The name was applied later to the head-dress of a priest, and, still later, to a pendent ornament at the back of a miter.

Infusion, a pouring in or into. That which is infused or introduced; suggestion. In pharmacy, a solution of some of the principles of vegetables, generally in water, but sometimes in other vehicles. Either hot or cold water may be employed, according to the particular infusion required. The digestion, however, must be longer when cold water is used. The vegetable substances may be either fresh or dried. When fresh, they must be cut in pieces; and when dry, bruised or coarsely powdered. Water is then poured on the substance employed, and allowed to stand in a covered vessel for a space of time varying with the nature of the vegetable matter. It is afterward strained, and is then fit for use. Infusions are liable to spoil soon, especially when made with warm water, or if the substance be of a fermentable nature. To assist in keeping the infusion, or to increase its powers, alcohol is sometimes added after straining. Wholesale chemists are now accustomed to prepare concentrated infusions for the use of general practitioners. These can be diluted to the ordinary strength at the time of using them, and not only possess the advantage of keeping better, but save much trouble and loss of time.

Infusionism, the doctrine that the human soul is an emanation from, or an influx of, the Divine Substance. It is akin to the teaching of Pythagoras and of the Stoics. Its defenders in Christian times have relied on Gen. ii: 7. Infusionism is opposed to Traducianism, and to Creation-

ism, the doctrine accepted by the Eastern and Western Churches.

Infusoria, the name first given by Otto Frederick Müller to the mostly microscopic animalcula developed in organic infusions. A drop of water from a weedy or other pool or ditch, viewed by the microscope, contains them in countless numbers. Ehrenberg deemed them animals of compartively high organization. Many of his infusoria have been removed to the vegetable kingdom, and the others shown to have a simpler structure than he believed. Pritchard divided them into Bacillaria, which were clearly vegetable, Phytozoa on the borderland between animals and plants, and Protoza, Rotatoria, or Rotifera, and Tardigrada, clearly animal. They are placed by many as a class of Protozoa. Some years ago Professor Huxley elevated them into one of the eight primary groups, into which he divided the animal kingdom. They have neither vessels nor nerves, but possess internal spherical cavities. They move by means of cilia or variable processes formed of the substance of the body, true feet being absent. The sarcode is differentiated into an ectosarc and an endosarc; they have also a nucleus and a contractile vesicle. They occur everywhere, in salt as well as in fresh water. One, Noctiluca, is believed to take a great share in producing the phosphorescence of the ocean. The Infusoria proper (= Pritchard's Protozoa) are divided into three orders — Suctoria, Ciliata, and Flagellata.

Ehrenberg believes that the protective carapaces of some infusoria have been found in chalk flints. The "infusoria" found in the mineral called Tripoli, and in bog iron ore, are mostly vegetable Diatoms, and do not belong to the class as now restricted.

Infusorial Earth, a siliceous deposit formed chiefly of the frustates of Diatoms. It is used as Tripoli powder for polishing purposes, and as an absorbent of nitroglycerine in making dynamite.

Ingalls, John James, an American lawyer; born in Middleton, Mass., Dec. 29, 1833; was graduated at Williams College in 1855 and admitted to the bar in 1857; settled in Atchison, Kan., in 1858; became secretary of the Kansas Senate in 1861; was elected a member of that body in 1862; and was United States Senator in 1873–1891, during which time he attained wide reputation as a public speaker. He was also president pro tem. of the Senate during the last three years of his service. He died in Las Vegas, New Mexico, Aug. 16, 1900.

Ingalls, Rufus, an American soldier; born in 1820. He was graduated at the United States Military Academy in 1843, fought in the Mexican War and in the Civil War, served with distinction in the Army of the Potomac. He became quartermaster-general in 1882 and died in 1893.

Ingelow, Jean, an English poet and story-writer; born in Boston, Lincolnshire, in 1820. Her first published work appeared anonymously in 1850 under the title "A Rhyming Chronicle of Incidents and Feelings," edited by Edward Harston, M. A., Vicar of Tamworth. It was very favorably reviewed in the "Athenæum," and was followed by "Allerton and Dreux: or the War of Opinion" (1851), a story, and "Tales of Orris" (1860); but not till the publication of "Poems" in 1863 did Miss Ingelow become famous. This volume won the enthusiastic praise of critics and the instant approval of the public and has passed through many editions. The most widely appreciated poems in it are those entitled "The High Tide on the Coast of Lincolnshire," "Songs of Seven," "Honours," "Divided," "The Wedding Song," "Supper at the Mill," "Reaping," and "Brothers: and a Sermon." A contemporary critic wrote: "'Studies for Stories' are simple in style, warm with human affection and written in faultless English." This high standard was maintained in "Stories Told to a Child" (1865), and these were followed by other stories published, like them, anonymously. In 1867 she enhanced her poetic reputation by the publication of "A Story of Doom, and Other Poems." In the main piece she sought to picture the world before the Deluge, and among the other poems are "Night Watches," "Songs on the Voices of Birds," and "Gladys and Her Island." From that time she wrote a great many stories and novels, including: "Mopsa the Fairy" (1869); "Off the Skelligs" (1872), her first long story; "The Little Wonder Horn" (1872), a new series of stories told to a child; "Fated to be Free" (1875), "Sarah de Berenger" (1880); "Don John" (1881), and "John Jerome" (1886). Miss Ingelow later lived in London, engaged in benevolent and charitable works, and died in Kensington July 20, 1897. Much of her finest verse is filled with strange ecstasy and tragedy of the sea which was familiar to her in her childhood. Her works have been even more popular in the United States than in England.

Ingemann, Bernhard Severin (in'gä-man), a Danish poet and novelist; born May 28, 1798. A very prolific writer of the sentimental school, Ingemann began his literary career by publishing some volumes of lyrics (as "Procne," etc.). Then he was extremely successful with several selections of "Fairy Tales and Stories." But his best works were a series of historical novels, in which he took Walter Scott for his model —"Valdemar Seier" (1826), "Erik Menved's Childhood" (1828), "King Erik" (1833), and "Prince Otto of Denmark"

(1835). The poems "Waldemar the Great and his Men" (1824), "Queen Margaret" (1836), and "Holger Danske" (1837), which are based, like his novels, on incidents of Danish national history and tradition, rank among Ingemann's most successful efforts. Besides being prolific he was also versatile ,and essayed his hand in nearly all branches of pure literature, not the least estimable of his productions being "Psalms" (1825). He died Feb. 24, 1862.

Ingersoll, Charles Jared, an American author; born in Philadelphia, Pa., Oct. 3, 1782; son of Jared Ingersoll, Jr.; received a fair education and became a lawyer; was a member of Congress in 1813–1815 and 1841–1847; and United States district attorney in 1815–1829. He was the author of the poems "Chiomara" (1800), and "Julian" (1831), and of the works "Inchiquin — the Jesuit's Letters on American Literature and Politics" (1810); "Historical Sketch of the Second War between the United States and Great Britain" (4 vols. 1845–1852); "Influence of America on the Mind"; etc. He died in Philadelphia, Pa., May 14, 1862.

Ingersoll, Ernest, an American naturalist; born in Monroe, Mich., March 13, 1852; was educated at Oberlin College and the Harvard Museum of Comparative Zoölogy; employed on the Hayden Survey and the United States Fish Commission; later was engaged as a journalist in Montreal. His publications include "Oyster Industries"; "Friends Worth Knowing"; "Country Cousins"; "Knocking 'Round the Rockies"; "Crest of the Continent"; "Canadian Guide-Book"; "The Book of the Ocean"; etc.

Ingersoll, Jared, an American jurist; born in Milford, Conn., in 1722; was graduated at Yale College in 1742; commissioned stamp-agent for Connecticut in 1765. When the people arose against the law Ingersoll attempted to persuade the citizens of New Haven to accept it, but was compelled to resign his office. He was made admiralty judge of the Middle District in 1770. He was the author of a valuable pamphlet on the "Stamp Act" (1766). He died in New Haven, Conn., in August, 1781.

Ingersoll, Jared, an American jurist; born in Connecticut, in 1749; son of Jared Ingersoll; was graduated at Yale College in 1766; attained eminence in his profession in Philadelphia; was a member of Congress in 1780–1781, a delegate to the Convention which drew up the Federal Constitution in 1787; an unsuccessful candidate for Vice-President of the United States in 1812; and twice attorney-general of Pennsylvania. He died in Philadelphia, Pa., Oct. 31, 1822.

Ingersoll, Robert Green, an American lawyer; born in Dresden, N. Y., Aug. 11, 1833; was admitted to the bar in 1854; soon became distinguished in the courts and in Democratic politics as an orator; recruited the 11th Illinois Cavalry in 1862, and entered the army as its colonel. On Nov. 28, 1862, while trying with a force of 600 men to intercept a Confederate raiding body he was captured by a force of 10,000 men, but was soon paroled and given command of a camp in St. Louis. He soon afterward resigned. After the war he became a Republican; was made attorney-general of Illinois in 1866; was a delegate to the Republican National Convention in 1876 and there nominated for president, James G. Blaine, whom he termed "the plumed knight." He was prominent in politics for several years, and had he not given strong expression to his views as an agnostic he would doubtless have been honored with high offices. He settled in New York city in 1882 and practised law there till his death. His most famous lectures include "Some Mistakes of Moses"; "The Family"; "The Liberty of Man, Woman, and Child"; "The Gods"; and "Ghosts." His publications include "Lectures Complete"; "Prose, Poems and Selections"; and "Great Speeches." He died in Dobb Ferry, N. Y., July 21, 1899.

Inghamites, a religious sect rounded by Benjamin Ingham, one of the early Methodists. Separating from his original connection, he joined the United Brethren, but soon after founded a sect, the doctrines of which were a modification of those of the Glassites and the Sandemanians.

Ingleby, Clement Mansfield, an English Shakespearean critic; born in Edgbaston, near Birmingham, Oct. 29, 1823. He was educated at Cambridge for the law, which he abandoned for a literary career, and became famous as a Shakespearean scholar and critic, aiding in the Stanton edition. He wrote: "The Principles of Acoustics and the Theory of Sound"; "The Stereoscope"; "The Ideality of the Rainbow"; "The Mutual Relation of Theory and Practice"; "Law and Religion"; "A Voice for the Mute Creation"; "Miracles Versus Nature." He died in Ilford, Essex, 1886.

Inglis, Henry David (ing'lz), an English writer; born in Edinburgh, Scotland, in 1795. From mercantile life he drifted into literature; traveling widely, and under the pseudonym of "Derwent Conway," writing: "Tales of the Ardennes" (1825), a very popular book, duly followed by "Solitary Walks Through Many Lands" (1828), "Rambles in the Footsteps of Don Quixote" (1837), and various similar studies. He died in London, March 20, 1835.

Ingoldsby, Thomas. See BARHAM, RICHARD HARRIS.

Ingolstadt (in′gōl-stät), a town and fortress of Upper Bavaria, on the Danube. Its fortifications, demolished in 1820, have since been rebuilt stronger than they were before. Its university, once celebrated, was removed to Munich in 1826.

Ingot, a cast mass of steel from the crucible; a cast mass of gold or silver, more or less pure, for assaying; a cast block of gold, silver, or a properly proportioned alloy of either, for coinage, or for working into other forms, as watch cases, etc. The crude ingot of gold or silver, after becoming assayed and brought to the standard fineness, is cast into bars ready for rolling, if for coin. Iron is cast into "pigs," steel into "ingots," copper at one stage into "bricks," at another into "pigs"; tin is run into "blocks," silver from the subliming furnace is in porous blocks, called "bricks."

Ingraham, Joseph Holt, an American author; born in Portland, Me., in 1809; received a collegiate education; was ordained a Protestant Episcopal clergyman; became widely known through his writings. His publications include "The South-west, by a Yankee" (1836); "Lafitte: the Pirate of the Gulf"; "Captain Kyd"; "The Dancing Feather"; "The Prince of the House of David" (1855); "The Pillar of Fire" (1859); and "The Throne of David" (1860). He died in Holly Springs, Miss., in December, 1860.

JEAN INGRES.

Ingraham, Prentiss, an American author; born in Adams county, Miss., Dec. 22, 1843; received an academic education; served in the Civil War in the Confederate army, and was wounded and taken prisoner at Port Hudson. After the war he traveled extensively in the Orient, and began his literary career in 1870. He is the author of "Afloat and Ashore"; "Montezuma"; "The Cuban"; "The Shades and Shadows of Gotham" (1873); "Motherless" (1876); "Without Heart" (1878); "An American Monte Cristo" (1891); etc. He died Aug. 17, 1904.

Ingres, Jean Dominique Auguste (*ang*′gr), a French historical painter; born in Montauban, in 1781. He studied under David, and subsequently went to Rome. Here he resided for 15 years, after which he spent four years in Florence, by which time his fame was so well established that he was called to the School of Fine Arts in Paris as the successor of Denon, and succeeded Horace Vernet, in 1829, as Director of the Academy at Rome. Ingres occupies a middle place between the classical and romantic schools, and is chiefly remarkable for correct design, ideal composition, and sober painting. His best known pictures are "Jupiter and Thetis," a "Woman in the Bath," "Ossian's Sleep," "Raphael and the Fornarina," "The Sistine Chapel," "The Vow of Louis XIII." (regarded by many as his chef d'œuvre), "The Birth of Venus Anadyomene," "Jesus Disputing with the Doctors," "Racine in his Court Dress," "Jeanne D'Arc at the Coronation of Charles VII.," "Stratonice," "Portrait of Cherubini," and "La Source." He died in 1867.

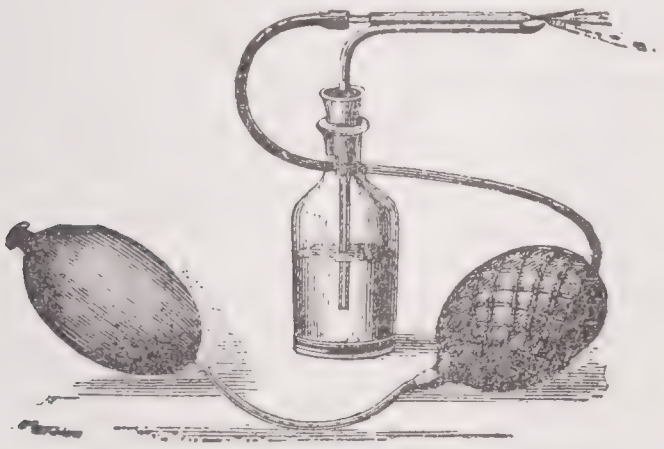
Ingress, ("a going in,") in astronomy, the beginning of the apparent transit of one body over the face of another, as of Mercury or Venus over the face of the sun, or of a satellite of Jupiter across the disk of that planet.

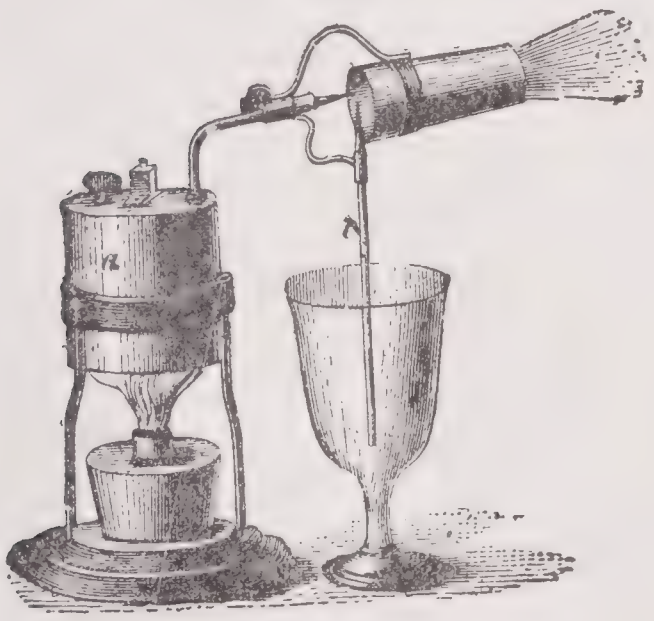
Ingrians, a Northern European people, now in process of absorption by Russia. They are said to be of Finnish stock and lost their independence in the 14th century or perhaps earlier.

Inhalations, a method of applying remedial agents to the respiratory tract, whereby these substances in a gaseous or atomized form are brought in contact with the mucous membrane of the nose, mouth, throat, windpipe, and air tubes and air cells of the lungs. Inhalations date from the days of Hippocrates and Galen. They are employed chiefly in diseases of the throat, nose, and air passages, and may be sedative, stimulant, and antiseptic. The medicines may be introduced with steam vapor, or may be nebulized or sprayed with an atomizer.

Inhaling Tube, a device for strengthening the breathing apparatus of consumptives and those afflicted with weak lungs. The tube is a simple instrument, about three inches long, and of greater diameter in the center than at either end. It looks very much like a cigar holder. One third of the way from the larger end is a small hole in the side of the tube, about as large in circumference as the lead (before sharpening) of a common Faber's pencil. A quarter of

an inch beyond that hole, toward the mouth, is a little bar that runs across the center of the tube from side to side. Between the cross bar and the end is a round ball the size of a small pea. This pea is large enough to stop up the end of the tube, but only about half large enough to fill the tube in the center, where the tube is larger than at the end. This is the whole machinery. Now, let a person put the smaller end of this tube in the mouth. When he draws air into his mouth through the tube he draws the little ball back, and it strikes against the cross bar. But the tube being larger in the center than it is at the front end, there is plenty of room for the air to come back into the lungs. When he exhales the air he blows the ball forward, which stops up the outer end of the tube, and the only place for the air to get out is





INHALING TUBES.

the little hole, the size of the pencil point. Its use is very simple. (1) It must be used when the stomach is not full, so as to give the abdominal muscles (which, in the case of consumptives, are generally inactive) room to move. (2) It must be begun very gradually by a consumptive, not over a minute or two or three minutes at first, and it should be used three times a day, very gradually increasing — not over a minute a day should the increase be — till the person is using it a half hour each time. It is

claimed by those who have tested it that the foregoing gymnastic lung exercise with the aid of this breathing machine has been of undoubted benefit to many persons suffering from pulmonary complaints.

Inhambane, a Portuguese station, capital of a district on the E. coast of Africa; just S. of the tropic of Capricorn, is beautifully situated on its bay, but unhealthy.

Inheritance, in biology, transmission in generation by descent. Darwin considers the inheritance of every character to be the rule, and non-inheritance the anomaly. Peculiarities tend to appear in the offspring at a corresponding age to that at which they arose in the parent, if not earlier. One appearing in a particular sex is often transmitted to that sex only. Sometimes there is a reversion to the characteristics of a remote ancestor. In law, a perpetual or continuing right to an estate invested in a person and his heirs. There are nine "canons of inheritance"; three may be quoted: (1) That inheritance shall, in the first place, descend to the issue of the last purchaser in *infinitum;* (2) That the male issue shall be admitted before the female; (3) That where two or more of the male sex are in equal degree of consanguinity to the purchaser, the eldest only shall inherit, but the females all together.

Inhospitable Sea, a name sometimes applied to the Black Sea. It is a translation of its most ancient name, Axenus, and was considered to accurately describe the manners of the inhabitants of its coasts.

Inia, a toothed fresh water Cetacean, not unlike a dolphin, but with certain anatomical peculiarities which keep it outside that family. It is found in some of the upper tributaries of the Amazon, and in the lakes near the Cordilleras. It measures about eight feet in length, has a long cylindrical snout with stiff hairs, and a very slight dorsal fin. It feeds chiefly on fish, and is hunted for the sake of the oil which it yields. It is generally found in little troops of three or four. The females show great affection for their young.

Initials, the first letters of one's full name, used as an abbreviation, or the first letters of any proper name of two or more words used as an abbreviation for the whole. Though in general it is usual and regular in all legal deeds and writings for a party to write his ordinary signature in full, yet in many cases, especially in documents of a mercantile nature, signature by initials will bind equally with the full signature. If, however, the subscription to a bill of exchange be by initials or marks it will not warrant summary execution; and the pursuer of an action on the bill will have to

prove that such initials or marks are the party's usual mode of subscribing.

Injections belong partly to surgery and partly to anatomy. In surgery fluids, different, according to the different effects desired to be produced, are thrown by means of a small syringe into the natural cavities of the body, or those occasioned by disease, partly to remove unhealthy matter, and partly to bring the remedy immediately to the seat of the disorder, and thus effect a cure. In diseases of the nose and the cavities connected with it, in those which have their seat in the neck, in disorders of the ears, the bladder and urethra, the uterus and vagina, and for the radical cure of hydrocele, injections are often used, and with important advantages. Pure warm water is injected with the highest success for the removal of pus, blood, or even foreign bodies. Sometimes astringent medicines, to restrain excessive evacuations, sometimes stimulating ones, to excite inflammation, as in hydrocele, or even to increase and improve evacuations, sometimes soothing medicaments, to mitigate pain, etc., are added to the water.

Injunction, a writ or process granted by a court of equity, and in some cases under statutes by a court of law, whereby a party is required to do, or to refrain from doing, certain acts, according to the exigency of the writ.

"The first peculiar remedy obtainable on this ground is the writ of injunction, the most ordinary species of which is that which operates as a restraint upon the defendant in the exercise of his real or supposed rights; and is, therefore, sometimes called the remedial writ of injunction, to distinguish it from the judicial writ, which issues after a decree, and is in the nature of a writ of execution. This writ may be had to stay proceedings at law, whatever stage they may have reached; to restrain alienations of property *pendente lite,* and tenants for life and others having limited interest from committing waste. It may be granted to restrain the negotiation of bills of exchange, the sailing of a ship, the transfer of stock, or the alienation of a specific chattel, to prohibit assignees from making a dividend, to prevent parties from removing out of the jurisdiction, or from marrying, or having any intercourse, which the court disapproves of, with a ward. The infringement of a copyright or a patent frequently calls for the exercise of this beneficial process; which may also be had to restrain the fraudulent use of trade marks, or of the names, labels, or other indiciæ of the makers or vendors of goods and merchandise, and in a large class of cases, far too numerous to be mentioned here."—Blackstone.

In the United States, the writ of injunction, as resorted to in labor disputes, has occasioned much controversy. Injunctions issued against strikers were alleged to "convert innocent acts into a crime." The Federal courts were the principle subjects of criticism in 1901.

Ink, a liquor or pigment used for writing or printing. It varies much in the details of its composition; all ordinary writing inks, however, owe their properties to the presence of gellate or tannate of iron held in suspension by means of gum. Gallnuts contain gallotannic acid, which gives a black precipitate with persalts of iron; they also contain pectose, which converts gallotannic acid, when exposed to the air, into gallic acid. This latter acid colors ferric salts a much deeper black than the former acid. The essential points in the preparation of a good writing ink are the presence of an iron salt, the infusion of gallnuts and gum, and the allowing the mixture to remain for some time exposed to the air. The following is one method for preparing black writing ink: Twelve pounds of bruised nutgalls are boiled for 3 hours in a cylindrical copper with 9 gallons of water, the water lost by evaporation being replaced from time to time; after all solid matter has settled to the bottom the clear liquid is drawn off and mixed with a mucilage prepared by dissolving 5 pounds of gum senegal in a little hot water and filtering; a solution of 5 pounds of ferrous sulphate (green vitriol) in water is then added, and the whole liquid allowed to stand until it begins to get black, when it is drawn off into bottles. It is preferable to bottle the ink before the iron is entirely converted into ferric gallate, so that, when used for writing, the particles of the ink may penetrate into the paper, and the iron salts there undergo a further oxidation and combination with the gallic acid. Another means of retarding the oxidation of the iron salts is to add a small quantity of an acid (generally sulphuric), which is perhaps neutralized by the bases present in the paper, thus allowing complete oxidation of the iron and consequently complete blackening of the ink to take place only after characters have been traced with it on paper. As ink is liable to become moldy it is customary to add a small quantity of such substances as essential oils, carbolic acid, crushed cloves, or sometimes corrosive sublimate, in order to prevent this result.

The following table taken from Watts' "Dictionary of Chemistry" shows the composition of several inks:

	a.	*b.*	*c.*	*d.*	*e.*	*f.*	*g.*	*h.*	*i.*	*k.*	*l.*	*m.*
Galls.....	225.	187.	133.	125.	66.	62.	31.	50.	174.	50.	60.	42
Green Vitriol..	75.	73.	55.	24.	22.	31.	19.	32.	87.	16.	20.	21.
Gum.....	25.	73.	55.	24.	19.	31.	8.	9.	43.	47.	20.	16.
Logwood.....	..	..	..	..	..	..	..	..	..	100.	20.	21.
Vinegar.....	..	..	..	..	..	..	..	125.	135.	..	..	..
Sugar.....	..	..	..	..	..	..	..	..	..	23.	1000.	16

Ink

These ingredients are calculated for 1,000 parts of water. Of these inks *a*, *b*, and *c* are too strong for ordinary use; *d*, *e*, and *f* are very good; *g* is rather too pale; the other inks are not genuine writing inks, however suited some of them may be for special uses. The addition of sugar causes the ink to adhere when dry, so that a copy of the writing may be taken off by pressing a moistened sheet of unsized paper on the written paper.

The so-called alizarin inks differ from ordinary inks only in containing a little free acid, the action of which in retarding the oxidation of the iron salts has already been explained. These inks also usually contain a small quantity of indigo dissolved in sulphuric acid, which prevents too pale an appearance in writing. Such inks become very black by exposure to ammoniacal fumes. An ink may be prepared by mixing logwood extract with potassium chromate; this ink is not liable to turn moldy, but it soon becomes viscid and gelatinous. Ink is sometimes prepared in cakes or powder, which when dissolved in water may be used as ordinary ink; the thickening ingredients added are usually madder and indigo dissolved in sulphuric acid. It is sometimes customary to color writing inks; the following methods of preparing colored inks produce very good results:

Red Inks.—One part of good carmine is dissolved in 120 parts of caustic ammonia, and 1½ parts of gum arabic, added. A cheaper ink may be prepared by drenching 12 parts of pulverized cochineal along with 4 parts of ammonium carbonate with 32 parts of hot water, then digesting and pouring off the clear liquid. Red ink may also be prepared by boiling Brazil wood in water, adding alum or cream of tartar, and thickening with gum or sugar.

Blue Inks.—The best blue ink is prepared by dissolving 30 parts of pure Prussian blue in 4 parts of oxalic acid dissolved in 1,000 parts of water.

Yellow and Green Inks.—The former ink may be made with decoction of saffron, the latter with indigo-carmine mixed with picric acid.

Hitherto we have been considering inks containing a certain amount of solid matter in suspension, which is deposited on the paper when the liquid portion of the ink has evaporated, but in all these cases the solid matter thus deposited may be removed either by washing with water or some other substance, such as chlorine, oxalic acid, etc.

It is sometimes a desideratum to obtain an ink which shall not be thus destroyed. Such an ink may be prepared by mixing India ink (which is essentially very finely divided charcoal) with ordinary writing ink. Traill's indelible ink is prepared by dissolving wheat gluten in vinegar of specific gravity 1.033, after steeping it for 24 to 36 hours in water and rubbing up the liquid with India ink or lampblack. This ink withstands the action of water, chlorine, or dilute acids. Another indelible ink may be prepared by mixing a decoction of galls with ammonium vanadate. Chlorine destroys the black color of this ink but does not efface the writing, acids will turn it blue.

Closely allied to indelible ink is that variety of ink used for marking linen; this usually consists of a solution of silver nitrate thickened with gum and sometimes colored by means of sap green. The linen to be marked is sometimes prepared by covering it with a solution of sodium carbonate, sometimes with pyrogallic acid dissolved in dilute alcohol; in the former case silver oxide, in the latter metallic silver, is precipitated on the linen after heating it. The writing by these inks may be effaced by a solution of potassium cyanide. Aniline black is also used as a marking ink.

We have now to say a little about a kind of ink which consists essentially of carbonaceous matter mixed with oil. The difference between printers' and ordinary ink may be illustrated by placing slips of paper having characters traced on them with both of these inks in an atmosphere of chlorine. This gas has a strong affinity for hydrogen, it therefore decomposes the ordinary ink, takes away the hydrogen, and thus bleaches it, while it has no effect on the printers' ink which consists mainly of carbonaceous matter. Printers' ink may be prepared as follows: Linseed oil, after being clarified from fatty matters, is boiled over the open fire, with the addition of a certain amount of yellow soap, which prevents smearing and gives a clearness to the impression of the ink. The required drying agents are also added while the oil is being heated, borate of manganese being frequently used for the purpose. When the oil has assumed somewhat of the character of a varnish, a quantity of lampblack, amounting to about 16 per cent. of the weight of the oil, is added and stirred up with the oil. The lampblack is best prepared by the careful combustion of naphtha. If it be wished to obtain colored printing inks, this may be done by adding the necessary pigments to the oil while it is being heated. Vermilion is used to give a red color, ultramarine for blues, and lead chromate for yellows.

For copperplate printing and lithographing a thicker ink is used, which is mixed with a denser black than that used for ordinary printing ink. The following are the necessary qualifications of a good printing ink: (1) It must distribute freely and work sharp and clean. (2) It must not adhere too tenaciously to the types. (3) It must dry immediately on the paper, but not dry at all on the rollers. (4) It must be

proof against the effects of time and chemical reagents.

Sympathetic inks were formerly used in secret correspondence, but they have now ceased to be thus employed as none of them will withstand the action of a strong heat. The characters written by these inks do not become visible until they are treated with some other solution or exposed to the action of heat. If a solution of gallnuts be used the writing only appears when washed with a dilute ferrous-sulphate solution. If the letters be formed by means of a dilute solution of potassium ferrocyanide (yellow prussiate of potash), the writing is made visible by wetting the paper with ferrous sulphate solution. A solution of cobalt chloride affords an ink which is colorless or very nearly so when cold, but becomes green (owing to the dehydration of the cobalt salt) when heated.

Inkbag, a gland found in the *Cephalopoda.* It is tough and fibrous, with a thin outer coat. The animal discharges the contents of the bag through a duct into the water when it wishes to conceal itself or escape from an enemy. The ink of the ink-bag, frequently consisting of finely divided particles of carbon suspended in fluid, is almost indestructible. It has been found fossil in Secondary rocks.

Inkermann, a village of Russia, in the S. of the Crimea. During the Crimean war, the Russians, nearly 50,000 strong, assailed the weakest part of the English position facing the harbor of Balaklava and the caverns of Inkermann, Nov. 5, 1854. For six hours, 8,000 British troops encountered at various points and resisted, the assault of this overwhelming force. The French came to the support of the English, and the Russians were driven back with great slaughter. The English loss amounted to 3,000, and that of the French to 1,726 men. The Russians lost about 2,000 killed and wounded.

Inlaying, the art of decorating flat surfaces by the insertion of materials differing from the ground or body in which they are inlaid, in color, texture, or other qualities. The body or basis may be wood, stone, or metal, and the inlaid or encrusted substances may be woods of various colors, ivory, mother-of-pearl, tortoise-shell, precious and other metals, marbles, and hard and precious stones, all these substances being selected principally on account of the brilliance and variety of their colors. Inlaying in wood is known generally as marquetry; in metals the inlay principally practised is called "Damascening"; and in marble and precious stones it forms a variety of mosiac work. As is the case with most decorative arts, the origin of inlaying can be traced to eastern countries. While some kinds of inlays were known in ancient Rome, the art as practised in modern times first took root in Venice in the 15th century, when small caskets were ornamented with inlays of ivory and wood in strictly geometrical patterns, such as continue to be reproduced to this day in the familiar inlaid work of Bombay. Contemporaneously the Florentines began to ornament furniture with small inlaid dice of ivory arranged to form various patterns, and this style of inlay has since become generally known as Certosa work, from the fact that the choir fittings in the church of the Certosa or great Carthusian monastery, near Milan, are ornamented in this manner. From these beginnings developed the Tarsia work of Italy of a century later, which, dealing at first with geometrical patterns in wood, developed into inlaid representations of architecture, views, figures and drapery, and finally into foliaceous scrolls of modern marquetry. Marquetry work in furniture was greatly elaborated in France, Germany, and Holland toward the close of the 17th century, and workers in wood found great delight in skillful elaboration of intricate designs. Toward the close of the 17th century a new development of marquetry was effected by a French artist, Charles André Boule, in the exclusive use of inlaid veneers of tortoise-shell and brass, now known as Buhl work. Both in design and execution Boule's work was of remarkable quality; the color of his tortoise-shell was frequently heightened by a backing of gold or vermilion, and his brass work was enriched with skillful engraving. Toward the close of the 18th century, while marquetry of a most elaborate character was being made in Germany and Italy, the richest triumphs of the art were produced in France by the famous *ebenistes* Reisner and Roentgen; but the Revolution put an end for the time to the manufacture.

Pietra dura, which consists of an inlay of bright-colored, hard, and precious stones, in slabs of marble or in panels of wood, is allied to the ancient mosiac work which flourished in the palmy days of Rome; but true mosiac, though embedded, is not inlaid. Pietra dura began to be made in Italy in the 15th century, but its extreme costliness prevented its extensive application. Two varieties were made in Italy, one being an inlay of minute pieces of stones with colors so arranged as to form a design or picture, like mosiacs of larger size. This is known as Roman mosiac, in contradistinction to Florentine mosiac, which consists of slices of stone shaped and inserted to form definite portions of the required design. This latter class of inlaid work was introduced into India by a French artist, Austin de Bordeaux, who decorated the famous Taj Mahal at Agra in pietra-dura of the richest and most elaborate character. The art then took root in that region, and to this day,

pietra dura of manifestly European character in design continues to be a characteristic art industry of Agra.

The ornamental treatment of metals by inlaying is principally confined to the encrusting and inlaying of wire and fine plates of gold and silver into iron, steel, and bronze. The inlaying of gold and, to a minor degree, silver wire into iron or steel is known as Damascening. In India such damescening is known as Kuft work, and extensively practised in the Northwestern Provinces. Effective combinations of inferior metals are also made in India; silver inlaid in a black alloy of copper, lead, and tin being known as Bidri work, from Bidar, in the Deccan. Combinations of copper and brass, and of brass and tin, are also common in the household vessels of the Hindus. The Japanese, who possess many alloys, excel in combining and inlaying them, often in relief, in their art metal manufactures.

Inman, Henry, an American author; born in New York city, July 30, 1837; received an academic education; removed to the West, where he was associated on the plains with William F. Cody ("Buffalo Bill"); was aide-de-camp to Gen. George Sykes of the 5th Corps during the Civil War; received the brevet of major for gallantry in the war and the brevet of lieutenant-colonel for his services in the Indian campaign of 1868–1869. His publications include "The Old Santa Fé Trail" (1897); "The Great Salt Lake Trail" (1898); "The Delaboydes" (1899); "Pioneer from Kentucky" (1899); etc. He died in Topeka, Kan., Nov. 13, 1899.

Inn (ancient Œnus), a river of Germany, the most important Alpine affluent of the Danube, rises in the S. of the Swiss canton of Grisons, and flows N. E. through the valley of the Engadine, and onward through Tyrol and Bavaria, to its junction with the Danube at Passau in a stream (320 yards) broader than that of the Danube. Its total course is 317 miles. In Bavaria its bed is broad and sown with islands.

Inn, a house where travelers are furnished, for the profit of the provider, with everything they have occasion for while on their journey. They may be set up without license by any person, provided he refrains from selling excisable liquors, which of course require a license. Innkeepers are bound to take in all travelers and wayfaring persons, and to entertain them if they have accommodation for them (and they are only bound to give such accommodation as they have), at reasonable charges, provided they behave themselves properly. As a protection they have a lien on the goods of their lodgers (with the exception of the clothing which they are actually wearing), so that they may retain them as security for the price of their lodging and entertainment.

Inns of Chancery, colleges in England in which young students formerly began their law studies. They are now occupied chiefly by attorneys, and solicitors.

Inns of Court, colleges or corporate societies in London, to one of which all barristers and students for the bar must belong; also the buildings belonging to such societies in which the members of the inn dine together, and barristers have their chambers. There are four such inns — viz.: the Inner Temple, the Middle Temple, Gray's Inn, and Lincoln's Inn.

Innate Ideas, the term generally supposed to correspond to the *koinai ennoiai* of the Stoics — "general notions developed in the course of nature in all men" — though the earlier teachers of that school regarded these ideas as the natural outgrowth of perceptions, not as innate. Thomas of Aquin, the greatest of the Schoolmen, taught that "there is no knowledge which is innate, and destitute of all experience." On the Continent the doctrine of innate ideas was revived by Descartes, who held that the notion of things, truth, and thought were naturally common to all men. Leibnitz said that "the ideas of being, substance, identity, the true, the good, are innate in the mind" though his innate ideas are rather slumbering than conscious notions. The doctrine will be found in the second elegy of Sir John Davies' "Nosce Teipsum" and in the "Treatise on Truth" of Lord Herbert of Cherbury. On the opposite side, Locke (Human Understanding, book i.), Culverwell (Light of Nature), and later writers may be consulted.

Inner House, the name given to the chambers in which the first and second divisions of the Court of Session hold their sittings in Edinburgh, Scotland; applied also to the divisions themselves, and used in contradistinction to the Outer House, in which the lords ordinary sit to hear motions and causes. All causes commencing in the Court of Session in regular form, by summons, letters of suspension, or advocation, reach the Inner House after passing through the Outer House.

Innerleithen, a Scotch village, near the Tweed's left bank. Its first woolen factory was established in 1790 about which time its saline spring (Scott's "St. Ronan's Well") came into celebrity.

Innes, Cosmo, a Scotch lawyer and historian; born in Durris, Sept. 9, 1798. Cosmo was educated at the Edinburgh High School, and graduated both at Glasgow and Oxford. In 1822 he passed as a Scottish advocate, became sheriff of Moray in 1840, and subsequently was appointed clerk to the Second Division of the Court of Session.

Cosmo Innes is best known as the author of "Scotland in the Middle Ages" (1860), and "Sketches of Early Scotch History" (1861). He died July 31, 1874.

Innes, Thomas, a Scotch historian; born in 1662. He may justly be looked on as the precursor of Niebuhr and Niebuhr's successors; for his "Critical Essay on the Ancient Inhabitants of Scotland" (1729) is much the earliest of all scientific histories. He died Jan. 28, 1744.

Inness, George, an American painter; born in Newburg, N. Y., May 1, 1825; studied painting in New York and Europe; resided in Italy in 1871–1875. His pictures are noted for the accuracy with which they represent the American climate and the aspects of American scenery. His "American Sunset" was exhibited in the Paris Exposition of 1867. His other works include "Peace and Plenty," "A Vision of Faith," "The Valley of the Shadow of Death," "River of Life," "A Passing Storm," "Twilight," "The Afterglow," "The Morning Sun," "Delaware Water-Gap," etc. He died Aug. 3, 1894.

Innisfail ("Isle of Destiny"), an old name for Ireland.

Innocent, the name of several Popes:

INNOCENT I., Pope, was a native of Albano, and succeeded Anastasius I. in 402. He endeavored to obtain terms of peace with Alaric, 407, but was unsuccessful, and during the following year Rome was taken and pillaged. He died in 417.

INNOCENT II., a Roman of noble birth, elected Pope in 1130, by a part of the cardinals, while others chose Peter of Leon, who took the name of Anacletus. The party of the latter being the strongest at Rome, Innocent II. retired to France, where he remained two years. This contest for the papal chair continued till the death of Anacletus, in 1138, though the monarchs of England, France, and Germany espoused the cause of Innocent. In 1139 Innocent was taken prisoner by Roger, King of Sicily, who had been the chief supporter of the rival Pope. He was released on recognizing Roger's title as King of Sicily. The same year Arnold of Brescia began preaching at Rome, and was banished. He died in 1143.

INNOCENT III. (Lothario Conti), one of the most eminent of the Roman pontiffs; born in Anagni, in 1161. He succeeded Celestine III. in 1198; and being endowed by nature with all the talents of a ruler, possessed of great erudition, and favored by circumstances, he was better qualified than any of his predecessors to extend the papal power. His first care was to recover and secure such portion of the domains of the Holy See as were in the hands of usurpers. He applied himself earnestly to the improvement of the administration of justice in his estates, and with his high notions, derived from Hildebrand, of papal supremacy, he expected that all great questions, civil and ecclesiastical, should be decided by himself. He sought to unite the Christian princes in a crusade for the recovery of Palestine, and shortly afterward promoted the crusade against the Albigenses. He had put France under an interdict, because Philip Augustus divorced his queen, Ingeburga; and when John, King of England, refused to confirm the election of Stephen Langton, as archbishop of Canterbury, Innocent laid the kingdom under a ban also, and, in 1212, formally deposed John, and instigated the King of France to attack England. John was finally obliged to submit, resigned his territories to Rome, and received them as a papal fief, from Innocent. In 1210 the Pope excommunicated the Emperor Otho IV., who owed to him his elevation. Innocent abolished the Roman Senate and Consulate, and thus made himself absolute in his estates, which now extend-

INNOCENT X.

ed from the Adriatic to the Mediterranean. Almost all Christendom was now subject to the Pope; two crusades were undertaken at his order, and his influence extended even to Constantinople. Innocent enforced purity of morals in the clergy and was himself irreproachable in private life. In 1215 he convoked the fourth general council of the Lateran. He died in 1216.

INNOCENT IV. (Sinibaldi de Fieschi) was a Genoese, and became chancellor of the Roman Church. Gregory IX. created him a cardinal in 1227. He succeeded Celestine IV. in 1243 at which time the court of Rome was engaged in a contest with the Emperor Frederick II. Innocent was obliged to retire to France, where he held the council of Lyons, in which Frederick was excommunicated. He is said to have been the first who gave red hats to the cardinals. He died in Naples in 1254.

INNOCENT V., a Dominican, became archbishop of Lyons, cardinal, and succeeded Gregory X. in 1276, but died five months after his electiion. Some religious pieces of his have been printed.

INNOCENT VI., cardinal-bishop of Ostia, succeeded Clement VI. in 1352. He was a man of great learning and liberality, and some of his letters are extant. He died in Avignon in 1362.

INNOCENT XI.

INNOCENT VII., born in Abruzzo in 1336, was elected Pope in 1404, but not without great opposition. He died in 1406.

INNOCENT VIII., a noble Genoese, of Greek extraction; born in 1431; obtained the tiara, in succession to Sixtus IV., in 1484. He endeavored to organize another crusade but without success. He died in 1492.

INNOCENT IX., born in Bologna, in 1519, ascended the papal throne on the death of Gregory XIV., in 1591, but died two months afterward. He died in 1591.

INNOCENT X. (J. Baptist Pamphilius), a Roman, succeeded Urban VIII. in 1644, at the age of 73. He condemned the doctrines of Jansenius, and prosecuted the Barberini family with great violence. He died in 1655.

INNOCENT XI. (Benedetto Odescalchi), born in 1611, was the son of a banker at Como, in the Milanese. In his youth he served as a soldier in Germany and Poland, quitted the camp to take orders, and rose through the intermediate dignities to the pontificate in 1676, on the death of Clement X. He was eminent for his probity and austerity, declaring himself against nepotism, restraining luxury and excess, and even prohibiting women from learning music. He also resolved to put an end to the mischief which had grown out of a prescriptive claim of the foreign ambassadors at Rome to a right of asylum. This led to a long quarrel with France, as Innocent would not yield to menaces, or make any exception to his rule not to receive an ambassador who would not renounce such claim. The sect of the Quietists arose at Rome under this pontificate, headed by the Spanish priest Molinos, against whose person and doctrines the Inquisition published a decree. Innocent died in 1689.

INNOCENT XII. (Antonio Pignatelli), a noble Neapolitan, succeeded Alexander VIII. in 1691. He abolished the extraordinary distinctions paid to the nephews of Popes, and condemned the "Maxims of the Saints," written by Fenelon. He died in 1700.

INNOCENT XIII. (Michael Angelo Conti), a Roman, and the 8th Pope of his family, born in 1655, succeeded Clement XI. in 1721. He is said to have died of chagrin for having been persuaded to bestow a cardinal's hat on Dubois. He died in 1726.

Innocents' Day, the English name for the feast celebrated on Dec. 28, to commemorate the massacre of the children of Bethlehem by Herod, in the hope of killing Jesus. It was probably first celebrated toward the close of the 5th, or early in the 6th century. It is known in the Latin Church as the Feast of Holy Innocents, and Mass is said in purple vestments, probably because the Innocents "did not enter heaven till Christ at His Ascension opened it to those who believe." On the octave the vestments are red, the proper color of martyrs. In the Greek Church the feast is celebrated on Dec. 29, and is known as the Feast of the 14,000 Holy Children.

INNOCENT XII.

Innominate Artery, the largest of the vessels which proceed from the arch of the aorta. It arises from the transverse portion of the arch before the carotid artery. It ascends obliquely toward the right, and divides into the right subclavian and the right carotid artery. It varies in length from 2 inches to 1 inch or less. Called also the brachycephalic artery.

Innominate Bone, the os coxæ, or pelvic bone. It is constricted in the middle and expanded above and below, and much bent. It articulates with its fellow of the opposite side, with the sacrum, and with the femur. In early life it is in three portions; the ilium, the os pubis, and the ischium. They begin to ossify before birth, but the process is not completed till the 23d or 25th year.

Innsbruck, the capital of Tyrol, 109 miles from Munich. It is a beautiful place, with broad, shaded streets, arcaded shops, and four squares adorned with statues. The Franciscan Church, or Hofkirche, built in the Renaissance style in 1553–1563, contains a beautiful and elaborate monument to the Emperor Maximilian I. In the same church are monuments to Andreas Hofer and his comrades Speckbacher and Haspinger, and to the Tyrolese who fell in the wars against France (1796–1809). The university (founded in 1677, and, after several vicissitudes, organized anew in 1826), has the usual four faculties and upward of 800 students and 100 professors and lecturers; rich in Alpine flora, and the usual museums, laboratories, etc. Among the eight monasteries of Innsbruck is the first that the Capuchins founded in Germany (1594). Innsbruck carries on manufactures of woolen cloth, machines, and glass, and glass-painting. It is much visited by tourists in the summer. Pop. (1904) est. 40,000, including suburbs.

Innuendo, an indirect or oblique hint or intimation; an insinuation. Also a law term, most used in declarations, and other pleadings, and the office of this word is only to declare and ascertain the person or thing, which was named uncertain before; as to say, he ("innuendo," the plaintiff) is a thief: when as there was mention before of another person.

Innuit, the native name of the people occupying the entire coast line of Alaska, with the outlying islands along the Arctic coast to Bering Strait, S. to the Alaska Peninsula, E. and N. along the Pacific coast to Mount St. Elias, with the exception of a small territory on Cook's Inlet and at the mouth of Copper river, where the Tinneh from the interior have forced their way to the coast. The Innuit of Alaska are a much finer race physically than the Eskimo of Greenland and Lapland. They are tall and muscular, many of them being 6 feet and over in height. They have small black eyes, high cheek bones, large mouths, thick lips, coarse brown hair, and fresh yellow complexions. Occupying the coast line, they are bold navigators and skilled fishermen and sea hunters. With the exception of those in Southern Alaska, they are barbarians, never having had civilizing, educational, or religious advantages.

Ino (ē′nō or ī′nō), in classic fable, a daughter of Cadmus and Hermione. She married Athamas, King of Thebes, after he had divorced Nephele, by whom he had two children, Phryxus and Helle. Ino became mother of Melicertes and Learchus, and soon conceived an implacable hatred against the children of Nephele, because they were to ascend the throne in preference to her own. Phryxus and Helle were informed of her machinations, and escaped to Colchis on a golden ram. Juno, jealous of Ino's prosperity, sent Tisiphone to the palace of Athamas, and caused such disturbance therein that Athamas, taking Ino to be a lioness, and her children whelps, pursued her, and dashed her son Learchus against a wall. Ino escaped his fury, but threw herself from a high rock into the sea, with Melicertes in her arms. The gods had compassion on her, and Neptune made her a sea deity, afterward called Leucothoe. Melicertes also became a sea god, known by the name of Palæmon.

Inoculation, the act, art or operation of communicating a disease to the bodily frame by introducing, by one or more punctures in the skin, or otherwise, the specific poison by which it is produced; also the introduction in such a manner of variolous matter into the system. Whether or not inoculation for smallpox was known in China and India at an earlier period than in Europe is doubtful. It seems to have been practised in South Wales without attracting notice. It is to Constantinople that the world is indebted for the discovery. In 1713 Dr. Emanuel Timoni, a Greek physician there, wrote a letter to Dr. Woodward in favor of inoculation, which was published in the "Philosophical Transactions," as was a notice of a work in its favor by Dr. Pylarini the Venetian consul at Smyrna. In 1715 inoculation was also supported by Mr. Kennedy, an English surgeon who had traveled in Turkey; but the actual introduction of the practice into England was brought about by a letter written in a lively style from Turkey in 1717, by Lady Mary Wortley Montagu. Gradually it made way, and was firmly established by 1798 in which year Dr. Jenner announced the discovery of vaccination. Before this, the improved methods introduced by Daniel and Robert Sutton had reduced the mortality, which, in 1797, 1798, and 1799, in the smallpox hospitals was only 1 in 662. Inoculation for smallpox is performed by applying the variolous matter to a few scratches made upon the skin. It communicates actual variola, which, however, as a rule, is of a mild type, but acts as an excellent prophylactic against a malady of more virulent character. The stage of incubation is shorter in the inoculated than in the natural smallpox. The quantity of

the eruption is moderated and the chief force of the disease is expended upon the skin, to the relief of the internal organs. While inoculation protects the individual, he may, in a natural way, communicate the disease to others, and that in malignant form.

Inorganic Chemistry, the chemistry of inorganic or unorganized bodies. The discoveries of the past few years have rendered it impossible to say where inorganic chemistry ends and where organic chemistry begins; but in general terms it may be said that inorganic chemistry treats of the metals, or of the metals in combination with one or more of the non-metallic bodies. A metal in combination with oxygen produces an oxide, while a metal in combination with an acid produces a salt, both being inorganic compounds. The union of iron with oxygen produces ferrous oxide, FeO, and ferric oxide Fe_2O_3; with chlorine ferric chloride, Fe_2Cl_6; while ferrous and ferric oxides, when combined with sulphuric acid, produce ferrous sulphate $FeO \cdot SO_3 7H_2O$, and ferric sulphate, $Fe_2O_3 \cdot 3SO_3$. The aim of inorganic chemistry is to examine into the general laws or rules which regulate the formation of such metallic bodies, and to determine the action of one upon another.

Inosite (in′ō-sīt), in chemistry, $C_6H_{12}O_6 \cdot 2H_2O$, a non-fermentable substance, isomeric with glucose discovered by Scherer in the muscular substance of the heart of the ox. It has since been found to exist in the lungs, kidneys, liver, spleen, and brain, and in the urine during some diseases of the kidney. It is obtained from the mother liquor of the creatine crystals, by acidulating with sulphuric acid, and then gradually adding alcohol till a turbidity begins to appear. Potassic sulphate first separates, and, on adding more alcohol, inosite in cauliflower-like groups of colorless crystals, which on recrystallization assume the form of large rhombic prisms of sweet taste. Inosite effloresces in dry air, giving off its water of crystallization, and leaving anhydrous inosite, $C_6H_{12}O_6$, as a white efflorescent mass. It melts at 210°, and dissolves in 16 parts of water at 10.5° C., but is insoluble in absolute alcohol and in ether. On evaporating inosite nearly to dryness with nitric acid, adding a solution of ammoniacal calcic chloride, and again evaporating, a beautiful and very characteristic rose coloration is obtained. When inosite is dissolved in strong nitric acid, and concentrated sulphuric acid added, nitro-inosite separates. This has the composition $C_6H_6(ONO_2)_6$, which indicates that inosite is not a aldehyde sugar, but a hexhydric alcohol of the formula $C_6H_6(OH)_6$. Inosite is also found in many plants, especially in green beans, the shells of peas, in the leaves of the vine, in asparagus, etc.

Inouye, Kaoru, Count (ē-nö-yā′ or *ang*-ö-ë′), a Japanese statesman; born in Chohu in 1839. He made a journey to Europe in early life and upon his return urged the adoption of Western civilization upon Japan. He entered office in 1868 and was steadily promoted. In 1892 he was made Minister of the Interior, and in 1895 he went on a special mission to Korea.

Inowraclaw (ē-nov-räts′läv), or **Jung Breslau** (yöng bres′lou) ("Young Breslau"), a town of Prussia; near the Polish frontier, 66 miles N. E. of Posen. Its chief industries are salt-mining, the manufacture of salt and machines, and iron-founding.

In partibus, the usual contracted form of the Latin phrase, *in partibus infidelium* = in countries belonging to unbelievers. Bishop *in partibus,* a bishop consecrated to a see formerly existing, but which, owing chiefly to the rise of Mohammedanism, has long been lost to the Roman Church. Bishops *in partibus* date from the Reformation. Catholic affairs in England were managed by Vicars-Apostolic, having titular sees *in partibus,* from 1623 to the erection of the hierarchy in 1850. Besides Vicars-Apostolic, in a non-Catholic country, the Vicars of Cardinal-bishops, Suffragan-bishops, and Papal Nuncios usually have their sees *in partibus infidelium.*

Inquest, in legal proceedings, most commonly the finding of the court or jury in a civil case, when the defendant does not appear on the trial. Also the investigation made by the coroner, with the aid of a jury, as to the cause of a sudden or violent death.

Inquisition (Latin *inquisitio* = a seeking or searching for), in the history of the Roman Catholic Church, a tribunal for searching out, inquiring into, and condemning offenses against the Canon Law, especially heresy, and taking means to have the offenders punished by the Civil Power. Inquisitors and the Inquisition did not come in together; the former preceded the latter (see INQUISITOR). It is sometimes erroneously said that St. Dominic suggested to Innocent II. the institution of such a tribunal, and was by him appointed the first inquisitor. In reality it was resolved on at a synod held at Toulouse, in 1229, under Gregory IX., after the Albigensian crusade, and was formally established by him in 1233, Innocent having died in 1216, and Dominic in 1221. The synod ordered that in every parish a priest and several respectable laymen should be appointed to search for heretics, and bring them before the bishops. Ere long the

bishops handed over the invidious task to the Dominican order. Gregory appointed none but Dominicans, Innocent III. occasionally Franciscans, and Clement III. sent into Portugal a prior of the order of Minims. The tribunal was called the Holy Office, or the Holy Inquisition. Its judges being more accustomed to ecclesiastical than to genuine legal procedure, encouraged informers, concealing their names from the person accused, who was urged to make a complete confession. Torture was also used to extract evidence. It was established in France in consequence of the decrees of the Synod of Toulouse. Philip the Fair converted its tribunals into State Courts, by means of which he crushed the Templars. In 1538 the Grand Inquisitor, Louis de Rochelle, was convicted of Calvinism, and burnt. The power of these courts was soon after transferred to the Parliament, and finally, in 1560, to the bishops.

Nowhere in the world did the Inquisition find a more congenial soil than in Spain. There were in that country multitudes of Mohammedans and Jews, who, to shelter themselves from persecution, professed to be Christians, while all the time not merely practising their former religious observances in secret, but actually making proselytes to their respective faiths. In 1481 the Inquisition was established at Seville by Ferdinand and Isabella, two Dominicans being the first judges. Torquemada, another Dominican, who became Grand Inquisitor in 1483 and held office for 15 years extended it to various other towns. It was popular with the lower orders and the clergy, but was hated with a deadly hatred by the nobles and the middle classes. It was introduced into Peru and Mexico in 1571. Llorente, the historian of the Inquisition, was its secretary at Madrid from 1790 to 1792. Napoleon I. suppressed it on Dec. 4, 1808, and it was abolished on Feb. 12, 1813, by the Cortes. Ferdinand VII. having reëstablished it in 1814, the Cortes in 1820 abolished it again. (See AUTO DA FÉ.) In 1526 it was set up in Portugal; in 1815 its acts were burned at Goa. The Congregation of the Cardinals of the Holy Inquisition was instituted by Pope Paul III. in 1542, and remodeled by Sixtus V. about 40 years later. It is composed of 12 cardinals, of a commissary, who acts as judge, of a counselor or assessor, of consulters, an advocate, etc., and is under the immediate presidency of the Pope. The opening of the dungeons of the Inquisition at Rome, in 1848, by the Roman Triumvirs, created a deep feeling throughout Europe against the Inquisition and the papacy. The attempted introduction of the Inquisition into the United Provinces caused the loss of that fertile territory to Spain. No inquisitor, under that name, seems to have ever been commissioned to England; and when, in the 13th century, Conrad of Marburg attempted to establish the "Holy Office" in Germany, he was assassinated, and the Inquisition never obtained a firm footing in that country.

In law: (1) A judicial inquiry, investigation, or examination; an inquest. (2) The verdict of a petty jury under a Writ of Inquiry; also where the court requires a particular fact certified, or requires the sheriff to do certain acts in furtherance of its judgment.

Inquisitor, in church history, a person appointed to search out latent heresy. The name first appears in the Theodosian Code, A. D. 382; their search being chiefly directed against the Manichæans. During the crusade against the Albigenses, early in the 13th century, Innocent III. had sent out legates to search out and punish these separatists. These were also called inquisitors. Dominic was one of them, whence arose the opinion that he was the first high functionary of the tribunal called the Inquisition. Specifically, a functionary of the ecclesiastical tribunal called the Holy Office of the INQUISITION (*q. v.*).

Insanity, a more or less impaired condition of any or all of the mental functions involving the intellect, emotion, or will. The phenomena of acute intoxication or fever, though analogous in form to those of insanity, being temporary are not usually regarded as symptomatic of mental disease. Comatose conditions, somnambulism, eccentricity, hysteria, transitory brain excitements due to religious or other strong emotions or due to other adequate causes must also be excluded. An insane man is unfit to do his work or manage his affairs, or mingle in the society of his fellow-men. In some cases he is unsafe to himself or to society.

Tests.— There can be no absolute test of insanity — or of sanity for that matter. Sanity is proved by normal self-control, and insanity by the loss of it from disease. The presence or one or more insane delusions was at one time the legal test, but it is not a true or scientific one. The "knowledge of right and wrong" was at one time a legal test of responsibility, in other words of sanity, by the law, but it has long been abandoned by those familiar with mental diseases. Unfortunately, knowledge of right and wrong is the prevailing test in the English and in many American courts. Insanity cannot be properly studied or in any degree understood, except by reference to the mental functions of the brain. A physiological view of mind can alone throw light on the complicated and wondrous phenomena of this disease. No progress was made in its study or treatment till physicians

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came to look at it in precisely the same way as they do ordinary disease.

General Symptoms.—The most common mental symptoms are morbid emotional depression and mental pain. In many cases of insanity to energize mentally is to suffer pain. Another symptom in other cases is an undue emotional exaltation; this is commonly associated with a loss of the great controlling or inhibitory functions of the brain, and occurs in mania. There is morbid brain excitement, commonly exhibited in restless motions or shouting. Such cases may go on to complete loss of any consciousness of all the former brain impressions and mental life. The patient remembers nothing and does not know his nearest friends. Another common symptom is a diminution or loss in the power of attention. This is common to nearly all forms of insanity. Then we have perversion of the reasoning power, as seen more frequently in insane delusions, which are common in most cases and varieties of insanity. They are divided into fixed delusions and changing delusions, the former being the more serious and incurable. The origin of insane delusions is one of the most interesting and often the most obscure of psychological problems. In some cases the process can be clearly traced, being analogous to the process of "day dreaming" in children. Imagination and fancy are vivid, the reasoning and comparing power is in abeyance, and so the subjective is taken for the objective. Every time a fancy is so looked on it gets more and more "organized" into a real delusion. Sometimes delusions result from the accentuation of the natural mental temperament by outward circumstances. Hallucination is sensation without an object. The hearing of voices, when none exist, is a good illustration. Hallucinations are usually subjective and psychical in their origin, though unquestionably both a psychical and a sensorial element may enter into their genesis. Hallucinations may be of hearing, which are the most common and the most serious, as a symptom of incurability if long continued; of sight, the next most common and more likely to be recovered from; of smell and taste, which are rare, and not favorable. Illusions are misinterpreted sensations. They are altogether psychical in their origin. Normal sensation is misinterpreted by reason of a perverted intelligence. Illusions occur most frequently in acute mania and in the toxic insanities. They are of more favorable prognosis than hallucinations. Illusions of sight are of the most frequent occurrence.

Hallucinations and delusions are often connected with and arise out of real sensations, which are misinterpreted by the weakened brain — *e. g.*, a man has been drinking, and has so disordered his stomach and irritated its lining membrane, that he feels a constant pain there and a bad taste in his mouth, and he concludes that poison has been put into his food, adducing these real sensations as proof of his delusion. His mind has been so disturbed by the poisonous effect of alcohol in the cerebral circulation that he can no longer reason clearly and put the true interpretation on the facts. A distinctive character of an insane delusion is that it cannot be changed or dispelled by the clearest demonstration that it is false. A man thinks he is ruined and a pauper: you bring his bank-book and show him that he has $5,000 to his account; and you bring the banker with the actual money to him, but you cannot eradicate the false belief. A sane man may have an illusion, but he knows his "brain is playing him a trick" when ordinary means are taken to demonstrate the unreality of his impression. Another very important and dangerous symptom in insanity is the tendency toward suicide. This is commonly a symptom in melancholia and usually goes with a depressed emotional state. But sometimes it exists by itself as a morbid unreasoning impulse. Sometimes patients attempt their lives when unconscious of what they are doing, and do not remember what they have done. Ideas of suicide may come into their minds unsuggested in the midst of work and even of enjoyment. Some patients will use the utmost cunning to conceal their intention of committing suicide, while others will do it most openly. Alcohol is responsible for very many suicides. Suicidal feeling or impulse is often recovered from, and is not a specially bad symptom. Another mental symptom of insanity very common is impulsiveness, or action in an automatic, unreasoning way sometimes without any conscious intention on the patient's part, and without power of control by the will. A man sees a large plate glass window and he impulsively hurls a stone through it. Another cannot resist the impulse to tear his clothes, a third cannot resist the impulse to set a haystack on fire. Uncontrollable impulse naturally goes with diminished volition in insanity. Patients may be fully conscious of morbid impulses, may intellectually see their danger or absurdity, and morally may deplore their own wickedness in yielding to them, yet have no power to control them; or they may be in a condition of unconsciousness, or false consciousness, during which impulsive acts are done and not remembered afterward at all. When consciousness returns such people are surprised and incredulous when told that they have smashed furniture or tried to kill their children.

One of the most common and most painful symptoms of insanity is a change of natural affection toward relatives. This is not

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universal, but in nearly half the cases of insanity the affective condition is thus perverted or reversed. The memory is not necessarily affected in insanity. In many patients it is exaggerated: things come back with unnatural vividness. A man during simple mania could repeat most of the Psalms and many of Shakespeare's plays, a feat which he never could perform when he was well. In some cases the memory brings back only the unpleasantness of past life, in others only the pleasant events, and in others there is no memory of past events at all during the attack. It is a constant source of anxiety to relatives whether patients remember the events that have taken place during their attack or their own sayings, feelings or thoughts then. It depends on the nature of the attack. The memory of events that happened during the attack is usually blurred or distorted or hazy, even though as in some cases the patients affirm they "can remember everything." It is frequent that after recovery they speak of the events during the attack and their own feelings then "as if it were a dream." Sometimes the appetites become perverted and changed; the social instincts are commonly altered. The imaginative faculty is usually perverted. In some cases an attack of insanity is a prolonged "day dream" the condition being one rather of disjointed fancy than of coherent or constructive imagination. The normal law of association of ideas is usually altered. In insanity the tendency is for ideas to suggest grotesque and incongruous things or trains of thought. The habits of life are notably changed in most cases, men and women becoming literally "not themselves" in their ways and modes of living. The cleanly becomes uncleanly; the orderly disorderly.

One of the chief bodily symptoms in insanity is sleeplessness. Almost every kind of insanity is sleeplessness in its early stages. Another is morbidness of speech: it may be incoherent or partially coherent; it may be over-rapid, slow or entirely absent. Often the conventionalities of speech are lost or dropped in insanity. The articulation of words may be changed. Next in importance to speech is the expression of the face and eyes. This is given by the most delicate combined muscular and nervous apparatus that exists in nature, being in the most intimate connection with the mental part of the brain, and acting as its chief expositor and interpreter. In the depressed and demented cases the eye loses its luster and brilliancy; in maniacal cases it has abnormal feverish brilliancy; the pupil enlarging and the eye-lids being drawn too far apart produce staring, by exposing not only the cornea, but much of the sclerotic as well. Irregularity of the pupil is suggestive of organic brain disturbance. The natural expression of the face is greatly changed, and little beauty of feature survives during acute attacks. The conventional control over the outward expression of the emotions is lost, and the face accurately shows the state of the melancholic, the maniacal or the demented patient. There are many cases where the expression caused by changed emotion during the first part of an attack gets fixed, and remains so after the patient has really ceased to feel the morbid emotion at all. In the muscular movements of the body an insane patient will often indicate his emotions far more than a sane man would. The functional activities of the skin, the hair, the perspiration, the liver, the heart, and the kidneys, are often changed, and the temperature of the body is altered during an attack of insanity. Before an attack there are often pains or uneasy feelings in the head, which disappear when it comes on. The bodily sensations are notably dulled in most acute attacks. Patients will often cut or bruise themselves or undergo operations without feelings of pain. The body weight is rapidly lost, and the general nutrition almost invariably suffers. Thus it is seen that disease cannot attack the highest organ and function without affecting also almost every other organ and function of the body. The higher brain centers and the peripheral organs act and react on each other, so that when the one is disturbed in action the others suffer.

Forms, Varieties, and Classification of Insanity.—At the present time only two classifications of insanity can be said to hold the field. The one is the "mental classification" used more or less by all physicians. In this the prevailing mental symptoms are taken as the basis of classification, the cases with similar mental symptoms being thrown together into each group. The weak point of the mental classification is that it is one of symptoms only; and a case may change entirely in its symptoms in the course of the same attack. The other classification, the "clinical," goes on the principle of selecting a more real, natural and lasting relationship between the cases than mere mental symptoms. The weak point in the clinical classification is that it does not cover the whole ground, many cases not being yet classifiable under any of its divisions. The classification of the future will be a combined clinical and pathological one, which will supersede the two others, but our knowledge of the pathology of the various forms of insanity is not as yet sufficiently accurate to enable such a classification to be made. The most recent and satisfactory classification of insanity is that of Dr. Emil Kraepelin. who seeks to ascertain the underlying disease

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process, whether functional or organic, whether in its nature tending toward recovery or dementia. In his classification little attention is given to the symptomotology of the emotions, which he regards as mere incidents liable to occur in almost any psychosis. Clouston's classification, though not as recent as Kraepelin's, still is very lucid and satisfactory for the general reader and is substantially as follows:

Melancholia, comprising all states of depression, and having emotional depression or mental pain and sense of ill-being as its leading and dominant symptom. There may in addition be loss of self-control, insane delusions, which are usually suggested by the depression or impulses toward suicide, as well as incapacity to follow ordinary vocations in melancholia. These distinguish it from sane melancholy. Suicide is the great risk in such cases; four-fifths of melancholic cases being suicidal. The chief of the bodily symptoms are apt to be thinness, weakness, a low nervous and nutritive tone, and stomach, bowel, and liver derangements. Melancholia forms about 30 per cent. of the insanity sent to asylums, but if the cases not sent to such institutions, but treated at home, are taken into account, it forms probably half the total number. Of melancholic patients sent to asylums 54 per cent. recover; but a larger percentage than this recovers if the cases treated at home are also included, because, of course, it is the worst class that require asylum treatment. The recoveries from melancholia are the most complete of all forms of insanity. It would seem to be caused by a more entirely functional and dynamical brain disturbance than any other form of insanity that may leave no trace whatever behind it after recovery.

Mania, comprising all states of mental exaltation, such as joyousness and rage, and commonly accompanied by muscular excitement, restlessness, sleeplessness, the speech tending to become incoherent, the conduct violent or uncontrolled. The symptoms range from a joyous elevation with talkativeness and merely want of common sense and foolish conduct up to complete incoherence, delirium, and raving madness, or "acute mania." In such acute cases the temperature of the body is raised as in a fever; often there is such rapid loss of body weight that 28 pounds are lost in a week, and the patients even die of the disease in about 8 per cent. of such acute cases; while on the other hand 60 per cent. recover and 30 per cent. become incurable. Folie circulaire, or states of regular alternation between melancholia and mania forms a small but distinct variety of insanity.

Monomania, or delusional insanity is that form where insane delusions are the chief signs of the mental aberration. In such cases the intellect is chiefly affected rather than the affective nature. The delusions are morbid in a particular direction, the chief forms being monomania of grandeur or pride, of unseen agencies, and of unfounded suspicions. Electricity, mesmerism, telephones, gases, noises made by imaginary persecutors are the common subjects of the second form; while utterly perverse interpretations of the conduct of friends or strangers is the common form of the latter. The two together are sometimes classed as monomania of persecution. Hallucinations of the senses — *i. e.,* imaginary sights, sounds, smells, and tastes — are very common in this form of insanity. It is not very curable when the delusions get fixed; but in the early stages, and when dependent on derangements of the bodily health, it is often recovered from. This form of insanity, and delusion generally, is of great importance from a legal point of view, but not so much from the medical side.

Dementia, or conditions of general mental enfeeblement, is the state of mind where the memory is impaired, the reasoning weakened, the feelings diminished, the will especially lacking, the attention and curiosity far below normal, these changes having occurred in a person who had at one time been normally constituted. It is in fact silliness, want of mental force, imbecility not congenital, but acquired. This does not usually occur as the first symptom of an attack of insanity, but as the sequel to mania — or, more rarely, of melancholia, when it is not recovered from; hence it is commonly called secondary dementia. Sometimes demented patients live on for many years. Dementia is in fact a premature mental death with persisting bodily life.

Stupor, embraces those cases where there is mental torpor, in which impressions on the senses produce no effect, the patient neither speaking nor taking notice of anything, and having no volition except to resist, but being able to stand, walk, and to eat. Trance and catalepsy are forms of stupor, the heart's action is low and the body is cold, and the muscles are flabby. Stupor commonly occurs in young people of both sexes and is very curable, 50 per cent. recovering.

Impulsive insanity, or states of defective control, is the most interesting of all the divisions of the mental classification, inasmuch as will is the highest of all the mental faculties, and volitional disturbances have a close relationship to morals, law, social life, and conduct. The children of insane or drunken parents are lacking in the normal power of control, and in their perception of the sense of right and wrong, their conduct being apt to be impulsive and not guided by reasonable motives. All

forms of insanity are more or less distinguished by lessened control, but there are persons without general depression or excitement, insane delusions, or enfeeblement of mind, who will suddenly smash furniture, tear clothing, steal, set things on fire, obey gross animal impulses, or kill themselves or others. The function of mental inhibition residing in the highest regions of the brain controls mental action in other portions of the brain convolutions. In this form of insanity it is supposed that the inhibitory controlling portions or "centers of mental inhibition" have lost their power. In many cases of impulsive insanity the mental portions of the brain act automatically without any controlling action by the inhibiting centers. The morbid impulse may lead a man to take away his own life or that of some one dear to him. Such impulsive insanity is often caused in hereditarily unstable brains by weak health and by alcohol.

Clinical Varieties. — Chief among these types of insanity is general paralysis, a specific disease of those portions of the brain that subserve mind and motion. It is always incurable, getting progressively worse, gradually impairing and at length destroying speech, motion, mind, and, usually in about three years' time, life itself. In this form of insanity patients commonly have extravagant delusions of wealth and power. It is found chiefly in the male sex, in large cities and manufacturing places. It is a disease of modern life and is increasing. Paralytic insanity is that connected with apoplexies, softenings and tumors of the brain, which cause ordinary paralysis first, and one form of dementia afterward. Epileptic insanity may accompany epilepsy. It is often attended by great violence and irritability, and by danger to those around the patient. Many murders are committed by insane epileptics. It is now much more manageable than formerly under modern medical treatment, but is apt to recur after apparent recovery. Syphilitic insanity is the result of brain poisoning by this terrible scourge of humanity. Alcoholic insanity is a very frequent form. Alcohol is the exciting cause of from 15 to 20 per cent. of all insanity; but not all the mental disease caused by alcohol is alcoholic insanity. There can be no doubt that some brains are so prone by heredity to be upset in their mental function that it takes little to do it. True alcoholic insanity always has motor symptoms, such as tremblings, convulsions, impaired speech, etc., except dipsomania, one variety where the insanity consists in the craving for excessive use of liquor, and lack of control over this craving. Alcoholic insanity may be intensely acute or very mild, very short in duration or very long continued, or incurable. Rheumatic and gouty insanities are very rare.

Phthisical insanity, or that connected with consumption, is a very interesting variety. The patients are suspicious and unsocial, and often have no cough or spit or other outward sign of consumption, which may not be discovered till the chest is examined. In some cases it is curable. The tendency to consumption and to insanity are often found in different members of the same family. There are various forms of insanity connected with derangement of the reproductive functions. Uterine, amenorrhœal, ovarian, hysterical, and masturbational insanities; while pregnancy, childbirth, and nursing are the causes of the insanity of pregnancy, puerperal insanity, and lactational insanity. These form 10 per cent. of mental disease in the female sex. They are the most curable of all forms, recovering in over 80 per cent. of the cases. Puerperal insanity occurs commonly within a fortnight of childbirth, and is the most acute and one of the most dangerous to life of all insanities, while the most curable, and is attended by the highest temperatures, sometimes reaching 105°. The different periods of life have each their own form of insanity. Pubescent and adolescent insanity is always hereditary, commonly acute and maniacal, usually has remissions and exacerbations and recovers in over 60 per cent. of the cases, those not recovering commonly passing into the most typical form of secondary dementia. It is one of numerous diseases to which the period of development is subject. Climacteric insanity occurs at the period of the menopause or the "change of life." It is usually melancholic in character and recovers in 53 per cent. of the cases under proper treatment and conditions of life. Senile insanity is typically seen in the senile dementia of extreme old age, when the memory and all the faculties have faded away. But spurts of mental excitement and mental depression, with sleeplessness and unmanageability at home, often occur before final dotage. These are often recovered from. They are a half-way house to dotage or a quick road to it.

A number of rarer and less important clinical varieties of insanity have been described. Traumatic insanity, from injuries to the head; anæmic insanity, from thinness of blood; diabetic insanity; insanity from Bright's disease; post-febrile insanity, following all kinds of fevers, especially scarlatina; the insanity of lead-poisoning; and myxœdematous insanity.

Causes of Insanity. — Hereditary tendency is the chief predisposing cause of insanity. All sorts of disturbing influences to the brain bring out this predisposition into actual disease. No doubt 70 per cent. of all cases have an insane or neurotic hered-

ity. Epilepsy, drunkenness, all nervous diseases, consumption, too exciting or depressing or exhausting employment, or unfavorable conditions of life in ancestry may cause insanity in the offspring. Marriage of near relatives causes it if the stock is bad; not if it is good. The physical causes of insanity affecting the body, such as alcohol in excess, produce insanity in four times the proportion which mental and moral causes, such as affliction, losses, love-affairs, and religious excitement, do. For the production of a case of insanity there may be and there usually is more than one cause — *e. g.*, (1) a man has a heredity; (2) he is at a critical time of life, or is run down in general health, or takes alcohol in excess; (3) he has a money loss or domestic affliction just before his attack. A heredity to insanity does not mean a bad brain or a weak mind before the insanity comes on. Often it is quite the contrary.

Nature of Insanity. — No one now doubts that it is due to disorder of function of a certain portion of the brain — viz., that part of the cortex which is the vehicle of all mental function. Essentially it in no way differs from many ordinary diseases; it begins, runs a definite course, and ends like many common ailments. It may be brought on by disorder in many other parts of the body, upsetting the brain; but with a sound brain there must be a sound mind. The exact pathology of many forms of insanity has not as yet been ascertained; but in 80 or 90 per cent. of the cases that die some abnormality can be found in the brain.

Treatment of Insanity. — The general principles of modern treatment may be divided into bodily and mental or moral. The bodily treatment may be generally said to be to put all the organs and functions right if wrong; to get up the strength and fat of the body; to restore the tone and right working of the nervous system; to restore the sleep; to give medicines that determine more blood to the brain in cases where there is too little, and to give those that diminish the brain's blood-supply in those where there is too much; to use suitable baths that soothe nervous irritation, and mineral waters; to invigorate and soothe by life in the open air; and to let off undue and morbid nervous energy by much exercise, gymnastics, and massage in some cases, and to secure complete brain and body rest for others. The mental treatment consists chiefly in careful observation, companionship, control, distraction of the mind from morbid thought and feeling, by suitable occupations and amusements, and guarding against the dangers of suicide, homicide, and self-neglect. The whole nursing of insanity is a most difficult task, for which the best bodily, moral and mental qualifications are needed.

Asylums for the Insane. — The United States has spent enormous sums to make the best provision possible for the mentally afflicted. As much as $3,000 a bed has been spent on several "state asylums" in New York, New Jersey, and Massachusetts. In most of the States all citizens, rich and poor alike, have the privilege of using the State asylums. The members of the Society of Friends in the State of Pennsylvania were the first to make philanthropic efforts to provide "hospital" accommodations for the insane, their efforts following at a very short interval the work of Pinel and Tuke. One of the most original asylums in the world in its plan is that at Kankakee, Ill. It has 1,600 patients, and consists of about 20 houses laid out on the two sides of a "street," forming in fact an insane town, all of whose inhabitants resort four times a day to a central dining-room or restaurant for their meals, and where a central ward for the sick, and the administrative buildings are also situated. The provision for the insane in the Southern States is backward and defective. The total number of insane in the United States on June 1, 1890 (census of the United States) was 106,485 — whites, 99,719; negroes, 6,535; Chinese, Japanese, and civilized Indians, 231. The number of insane males was 53,473, and of insane females, 53,012. The total number of insane reported in 1880 was 91,959. The number of insane in each 100,000 of the population in 1890 was 387.0 for the foreign whites and 140.5 for the native whites, and 88.6 for the colored. In 1880 the corresponding figures were 308.8, 161.9, and 91.2. The proportion of insanity was much greater among the whites than among the negroes, and very much greater among the foreign born than among the native born. The number of insane in asylums in 1890 was 74,028 — whites, 69,729; negroes, 4,299. The number of insane in asylums in each 1,000 of insane was whites, 699; negroes, 658. Reports from 30 States to the Committee on States of the National Conference of Charities and Correction showed 102,000 insane persons in 1896. At this rate the whole United States would have 145,000 insane.

C. P. Bancroft.

Inscriptions, the name given to records, not of the nature of a book, which are engraved or inscribed on stone, metal, clay, and similar materials. Since ancient documents committed to such destructible materials as papyrus, parchment, or paper have largely perished, inscriptions on harder materials are in many cases the sole sources of our knowledge of ancient history and of early languages; and, even when MSS. have been preserved by copyists, inscriptions, which preserve the original forms of the letters, are of supreme palæographical importance. All the books of the Phœ-

nicians, Sabæans, Etruscans, Babylonians, Assyrians, Numidians, and Iberians have perished, and hence a considerable portion of our knowledge of early Oriental history is derived solely from inscriptions. A very large number of inscriptions are mortuary epitaphs. Others, usually the most important, are records of the events in the reigns of kings. Others are dedications of altars, temples, or aqueducts. Many are of a religious character, recording donations to temples or in honor of the gods. Others are commercial contracts, banking records, receipts for taxes scratched on potsherds, GRAFFITI (*q. v.*), imprecations, and inscriptions on seals, gems, or vases. Probably more than 150,000 inscriptions are known, and a vast literature has accumulated around them. They are, however, usually classed, not by their subjects, but according to the language in which they are written, with a subsidiary chrononogical arrangement. The chief classes are Semitic, Greek, Latin, Runic, Cuneiform, Egyptian, and Indian.

American Inscriptions. — In Greenland, on the shores of Baffin Bay and Davis Strait, a few genuine Runic inscriptions have been discovered. They probably date from the 11th and 12th centuries, and were doubtless executed by Icelandic colonists or explorers. Records, variously conjectured to be Runic, Punic, Celtiberic, or Numidian, have also been found in the United States, notably on the Dighton Rock in Massachusetts, in the island of Monhegan off the coast of Maine, in the Grave Creek Mound in West Virginia, and elsewhere. They prove, however, on examination, to be either natural markings on the rock, or the half-effaced pictorial records of Indian tribes, or even inscriptions by early European colonists. Very different are the numerous inscriptions on the walls of the palaces and temples in the ruined cities of Yucatan, Honduras, Mexico, and Guatemala. They are written in unknown characters, which appear to constitute a system of hieroglyphic or pictorial writing, akin probably to that of the Aztec MSS., which as yet have been only imperfectly deciphered.

Insecta, insects; a class of Annulosa, division Arthropoda. Formerly it was made to include, among other animals, the centipedes and spiders. Now these are made distinct classes, and the Insecta confined to those arthropodous animals which have three pairs of legs; these are affixed to the thorax which is distinctly separated from the head and the abdomen. There are compound and simple eyes. In the highest orders there are four wings; in another order, Diptera, but two; and in several more the wings are rudimentary or totally absent. There is one pair of antennæ. The respiration is by tracheæ. Of the 13 segments, of which a typical insect consists, one constitutes the head, three the thorax, and nine the abdomen. The cutaneous skeleton is composed of chitine. There is generally a more or less complete metamorphosis. Insects exist in all countries. The species existing may be half a million, those known more than 200,000. Most of them are confined to particular regions; thus the insects of India and China are mostly different from those of Europe; so are those of North America, Greenland only excepted. some insects, however, like the Painted Lady Butterfly (*Cynthia cardui*), are widely diffused over the world. Insects exert a powerful influence in fertilizing plants. Tiny as they are, some of them may become formidable foes to man. The classification now commonly adopted divides insects thus: Sub-class I., Ametabola: (1) Anoplura, (2) Mallophaga, (3) Collembola, (4) Thysanura. Sub-class II., Hemimetabola: (1) Hemiptera or Rhynchota, (2) Orthoptera, (3) Neuroptera. Sub-class III., Holometabola: (1) Aphaniptera, (2) Diptera, (3) Lepidoptera, (4) Hymenoptera, (5) Strepsiptera, (6) Coleoptera. The oldest known insects are from the Devonian rocks of this country. They seem to have belonged to the Neuroptera. This order, with the Coleoptera and Orthoptera, exists in the Carboniferous, Hymenoptera and Lepidoptera in the Secondary formation, and nearly all the known orders in the Tertiary.

Insecticide, one who or that which kills insects. Also a substance or preparation used to kill insects. Among the insecticides are paris green, bi-sulphide of carbon, kerosene emulsion, lye, sulphur, white hellebore, etc.

Insectivora, an order of Mammalia established by Cuvier, who made it a family of his Carnassiers (Carnivora). It is of higher organization than the Carnivora proper. Huxley arranges it under his Mammals which have a discoidal deciduate placenta, placing it between the Primates and the Cheiroptera. There are usually more than four incisors in each jaw, and the molars have sharp and pointed cusps; the hallux possesses a claw, and has no marked freedom of adduction and abduction. Excepting in one genus, there are well-developed clavicles. The chief families are: (a) *Talpidæ*, (b) *Potamogalidæ*, (c) *Soricidæ*, (d) *Erinaceidæ*, (e) *Centetidæ*, (f) *Macroscelidæ*, and (g) *Galeopithecidæ*. Also a section of Cheiroptera (bats), containing the families *Vespertilionidæ*, *Rhinolophidæ*, *Noctilionidæ*, *and Phyllostomidæ*. Several families of the order Insectivora are found in the Miocene. Representatives of the cheiropterous section Insectivora are found from the Eocene onward.

Insectivorous, or **Carnivorous Plants,** plants which deviate from the usual plant method of obtaining nutriment from the soil and the air, and feed or subsist on insects or other small animals which they capture by ingenious contrivances. In these respects they make an approach to the animal class of nutriment and modes of food getting, setting traps, as it were, to catch their prey. These traps consist in the leaf, which is modified in some peculiar way to adapt it to the purpose. Among the insect-catching plants, one of the most notable is the Venus's fly-trap (*Dionœa muscipula*) of the Carolinas, the separated halves of whose leaves close instantly when their surfaces, which bear irritable hairs, are touched. The edges bear 12 to 20 long teeth, which closely interlock, the whole forming a live insect trap. The fly or other insect which has caused the closure is held till its soft parts are digested and its juices are absorbed by the leaf, when the latter opens again. A digestive secretion is thrown out, and the closed leaf acts as a true stomach, the work of digestion going on for a week or two. The sundews (genus *Drosera,* of which there are about 100 species) are notable for their power of capture. In these the leaves are thickly studded with hair or tentacles, which secrete a clear liquid which is extremely viscid, holding any insect which touches it. These hairs are sensitive also, and when one is touched others bend toward it, till the prey is covered and inclosed by a hundred or more of these hairs. Then the secretion becomes digestive and the juices of the insect go to feed the plant. Remains of a dozen insects have been observed on a single leaf. Other such contrivances exist. Of a different character are the pitcher-plants, of which there are many kinds in various parts of the world. In these the leaf takes the form of a vase, cup, or tube, with a hood or cover at the top by which the entrance may be closed. Water gathers within these hollow leaves, and, in some cases at least, a liquid secretion from the plant. In some species sweet drops are found on the outside of the leaf leading upward to the mouth, within which other honeyed drops appear. These are arranged in a trail to lure the unsuspecting insect to enter the dangerous cage. On the hood and within the pitcher are stiff hairs or bristles pointing downward, and acting to prevent the prey from crawling out again. The California pitcher-plant has a bright-colored appendage hanging from the opening as a lure to the insect. In some cases the whole leaf is converted into a pitcher. In others the pitcher is formed of the tip of the leaf, being attached to a bare extension of the midrib, which is so bent as to hold it upright. In East India pitcher-plants, *Nepenthes,* of which there are 31 species, are of this character. In these small cups flies and other insects are caught in large numbers. Some plants form their traps by uniting the bases of opposite leaves. Such is the case with *Silphium perfoliatum,* the cup-plant of the Western prairies. Dead insects have been found in these cups, and have probably been digested. The teasel has a similar structure. The bladderworts (*Utricularia*), of which there are about 160 species, are aquatic plants which bear curious little sacs, or bladders, on their dissected leaves, which float in the water. These have open mouths which are lined with bristles, and which, while offering ready entrance to minute insects, prevent their return. Various other adaptations of the leaf, more or less similar to those named, exist, and in many plants there are belts of sticky material on the branches, as in the catchfly and in a species of wire-grass. To what extent these adaptations are useful to the plant is not yet fully settled. When grown in the greenhouse these plants are found to flourish without insect food. But in nature they are usually found in poor soil, and some of them almost without roots, as in the cases of the sundew and butterwort — a plant belonging to the order *Utricularia.* Many of them have special attractions for insects, of color, odor, taste, etc., and special adaptions to hold their prey. Still more significant is the secretion of a liquid which has been proved to possess digestive properties. All these facts taken into consideration leave no doubt that many plants really feed on animal food, and thus in a measure depart from the ordinary plant economy and take on a function of the animal kingdom.

Insessores (-sōr′ēz), perchers, the name first given by Mr. Vigors, and adopted by Swainson and many others for a great assemblage of birds, mostly small in size, with feet adapted for perching and walking; the toes generally four, the hinder one on the same level with the others, generally three, more rarely two, pointing forward; in the latter case, the feet being scansorial. The length of the tarsus, or shank, is always moderate, the claws never retractile. Some have the bill without a notch, in others it is notched. Many sing beautifully, build elegant nests, etc. As to food, they are omnivorous. The order was divided into five tribes — Dentirostres, Conirostres, Scansores, Tenuirostres, and Fissirostres. The Scansores are now well-established as a separate order. The Insessores are called also Passeres and Passeriformes. The order is found in fossils from the Eocene onward.

Insignia, the name given to all outward marks of power and dignity, such as the

golden crown, the ivory chair, and the 12 lictors with their axes in the time of the Roman kings; the crowns and scepters of European monarchs; the pallium, the infula, the staff, and ring of the higher orders of the Roman Catholic priesthood. The name of insignia is also applied to the decorations worn by the different orders of merit.

Insolation, a synonym for sun-stroke; alsó a mode of treatment which consists in exposing the patient to the rays of the sun, and which is had recourse to with a view of rousing the vital forces when languishing, or of producing irritation of the skin. In pharmacy, the drying of chemical and pharmaceutical substances.

Insolvency. See BANKRUPTCY LAWS.

Inspiration, in scripture and theology, an extraordinary influence exerted by the Holy Spirit on certain teachers and writers so as to illuminate their understandings, raise and purify their moral natures, and impart a certain divine element to their utterances, whether oral or written. The chief New Testament passages on which the doctrine rests are two. The first is thus rendered in the Authorized Version: "All Scripture [is] given by inspiration of God, and [is] profitable for doctrine," etc.; in the text of the Revised Version this is, "Every Scripture inspired of God [is] also profitable for teaching," etc., and in the margin, "Every Scripture [is] inspired of God and profitable," etc. The second is II Pet. i: 21, "For the prophecy came not in old time by the will of man; but holy men of God spake [as they were] moved by the Holy Ghost" (Authorized Version). "For no prophecy ever came (margin, was brought) by the will of man; but men spake from God, being moved by the Holy Ghost" (Revised Version). The "Scriptures" were, of course, the Old Testament. (See also Job xxxii: 8, in which passage, however the inspiration referred to is only that common to all men of intellect.) The great majority of Christians hold what is termed "plenary inspiration" — viz., that the influence of the Holy Ghost on the sacred speakers and writers was such as absolutely to pervade their mind and heart, making their utterances as divine as if they had come from God without human instrumentality. With regard to the Scripture, a large majority hold what is termed "verbal inspiration" — *i. e.*, that each word of the Hebrew Testament and the Greek New Testament was suggested to the sacred penmen by the Holy Ghost. Of this school, Gaussen of Geneva was the modern apostle. A minority believe that the Scripture writers were preserved from all error only when they uttered moral and spiritual teaching, while in numbers, unimportant points of history, etc., they might err. A few reduce the inspiration of the sacred writers to that possessed by Shakespeare, Milton, Cowper, etc., in other words, identify it with what is termed GENIUS (*q. v.*). See BIBLE.

Installation, the act of installing; the act of investing with an office, charge, or rank, with customary ceremonies; as, the installation of a minister or presiding officer of some deliberative or social body; the state of being installed.

Instinct, according to Reid, "a natural, blind impulse to certain actions, without having any end in view, without deliberation, and very often without any conception of what we do"; and, according to Hamilton, "an agent which performs, blindly and ignorantly, a work of intelligence and knowledge. Various other definitions are given. Brougham says that instinct is distinguished from reason in that "it acts without teaching, either from others — that is instruction, or from the animal itself — that is experience"; "it acts without knowledge of consequences; it acts blindly, and accomplishes a purpose of which the animal is ignorant." In general we find that instinct and reason prevail in an animal in the inverse ratio to each other. Hence, in man, whose reasoning powers are highly developed, the instincts are few and manifest themselves principally in children and barbarians. An instinctive action is performed without any consciousness, on the part of the agent, of the end which it serves; it is effected as perfectly the first time as at any subsequent period; and is unsusceptible of any adaptation to particular emergencies; while a reasonable action, on the contrary, is one which always implies a consciousness, on the part of the agent, of the end in view — which becomes only progressively perfect, and which is capable of being variously modified according to existing circumstances. Some philosophers have held that there is no real distinction between instinct and reason. Darwin (Zoönomia) regarded all instinctive acts as really intellectual operations; while Smellie, on the other hand, viewed reason itself as really an instinct. Hume, too, asserts "that the experimental reasoning itself, on which the whole conduct of life depends, is nothing but a species of instinct, or mechanical power, that acts in us unknown to ourselves; and its chief operations are not directed by any such relations or comparisons of ideas as are the proper objects of our intellectual faculties."

Three classes of theories have been proposed to account for the instinctive actions: 1. The physical, which makes them depend on the structure and organization of the animal. 2. The psychical, which regards them

as the result of mental powers or faculties possessed by the animals, analogous to those of the understanding in man. 3. The supernatural, which views them as workings of an intelligence superior to man, or the Supreme Being. Of this last opinion was Isaac Newton. According to Bushman, instinctive acts can be traced to the direct effect of sensation, and are dependent on either external or internal stimuli, as ex ternally from the senses, internally from feelings — as hunger, thirst, etc. The great source of instinctive acts in the lower animals are, he says, smell and taste. They are all, however, referable to some uneasy sensations proceeding from certain irritations of particular organs; or, according to Broussais, they arise from "sensations which solicit a living being to execute involuntarily, and often unconsciously, certain acts necessary to its welfare."

Institute, a scientific body; a society or body established under certain rules or regulations for the promotion or furtherance of some particular object; a literary or philosophical society or association; in France, applied to the principal society of this kind, formed in 1795 by the union of the four existing royal academies.

Institution, in civil law, the appointment of a debtor as heir of a testator. Also a Christian educational establishment, with a school and college department, for teaching young Hindus and Mohammedans the religion and science of the West, chiefly through the medium of the English tongue. Chiefly Anglo-Indian.

Institution System, the system of missionary operations which directs its main effort to the founding and maintenance of an INSTITUTION (*q. v.*) in place of street preaching. The Rev. Dr. Alexander Duff, missionary of the Church of Scotland in Bengal, originated this method of missionary operations in 1830, by founding an institution at Calcutta. Other such institutions followed at Bombay, Madras, Poonah, Nagpore, etc. See MISSIONS.

Institutional Church, The, a Church which aims to reach all classes of people by a system of free pews and active ministration to the wants of its particular community. To quote from the platform of the Open and Institutional Church League (later merged into the National Federation): "The open and institutional church aims to save all men, and all of the man by all means, abolishing, so far as possible, the distinction between the religious and secular, and sanctifying all days and all means to the great end of saving the world for Christ. While the open and institutional church is known by its spirit of ministration rather than by any specific methods of expressing that spirit, it stands for open church doors for every day and all the day, free seats, a plurality of Christian workers, the personal activity of all church members, a ministry to all the community through educational, reformatory and philanthropic channels, to the end that men may be won to Christ and His service, that the Church may be brought back to the simplicity and comprehensiveness of its primitive life." Among the various features of the institutional church are a gymnasium, reading room, classes of instruction in sewing, carpentry, music, etc., and a system of volunteer offerings for the support of the work. There are an increasing number of institutional churches throughout the United States.

Instrument, in law, a document or writing, as the means of giving formal expression to an act; a writing expressive of some act, contract, process, or proceeding, as a deed, a contract, a writ, etc. In music, any mechanical contrivance for the production of sound. The musical instruments employed are divided into the following classes: Stringed; wind; and pulsatile. The stringed instruments are the pianoforte and older instruments of its kind which are played by means of a clavier or keyboard; the guitar and others whose strings are struck or plucked by the fingers; and the violin class played with a bow. Wind instruments are of wood or metal; those that are of wood in ordinary use are the flute, piccolo, hautboy, cor anglais, clarionet, basset horn, and bassoon; those that are of metal are the horn, trumpet, cornet-à-piston, trombone, ophicleide, saxhorn, bombardon, etc. The pulsatile or percussion instruments are the kettle-drums, great drum, side drum, triangle, cymbals, and tambourine.

Instrumentation, the art of using, in composition, the various instruments and combinations of the ORCHESTRA (*q. v.*).

Insufflation, in the Roman Catholic Church, the breathing, by the priest administering baptism, into the face of the recipient of the sacrament, to signify the new spiritual life which is to be breathed into his soul.

Insulæ Zenobii. See KURIA-MURIA ISLANDS.

Insulator, in electricity, a non-conductor of electricity so placed as to insulate a body. In thermotics, a non-conductor of heat placed so as to prevent the passage of heat to or from a body.

Insurance, an act or system of insuring, or assuring, against loss or damage. It is usually in the form of a contract called a policy, by which one party agrees, for a

certain sum, known as the premium, to indemnify or compensate another party against specified losses, as those arising from destruction to property by fire, shipwreck, etc., or from contingencies that reduce or put an end to individual earning capacity through disablement or death. The party guaranteeing the indemnity is called the insurer or underwriter; the party to be indemnified, the insured or assured; and the events or causes of loss insured against are termed risks or perils. That which is insured is called the insurable interest. Insurance in most of its essential features is a modern institution and peculiar in itself as a prime factor in the science of social economy. Several generations have passed since it began to influence great centers of trade, but men formerly had not the faintest idea of its ultimate significance, the unprecedented rapidity of its development, nor of its application in so many forms and directions. The practice of marine insurance appears to have long preceded that of fire insurance and that of life insurance. The precise period of its introduction cannot be determined, but the most probable date is believed to be about the beginning of the fifteenth century, although some contend that this kind of insurance was practised by the Greeks in the form of marine loans described by Demosthenes, and by the Romans as early as the time of the second Punic War. Certain guilds among the Anglo-Saxons had a kind of mutual insurance against loss from fire, water, robbery, etc. Viewed in its commercial aspect, however, insurance appears to have been first undertaken in Flanders about 1300, although its origin has likewise been credited to Italy and Spain more than a century later. Insurance is believed to have been introduced into England by the Lombards early in the sixteenth century, but few questions relating to it appear in court records before the middle of the eighteenth century. For more than two hundred years fire insurance has been practised in England; on the Continent and in America it was introduced somewhat later, and its history in the United States, together with that of life insurance and other forms, falls within the scope of special articles that follow.

Insurance, Accident and Miscellaneous. Of the miscellaneous forms of insurance the accident is the oldest and most widely known, and was concurrent with the development of railway traveling in England in the middle of the nineteenth century. Oddly enough, at first it was applied, not to bodily injury, but against loss of or damage to property while en route. In the United States the business of accident insurance traces its origin to the formation of the Travelers Insurance Company at Hartford, Conn., in 1863, its founder, James G. Batterson, having been impressed by the

Insurance

English system. The American public received the new departure with distrust, but it soon proved generally acceptable, growing with startling rapidity, until at the present time there are a number of big companies in the United States which lead the world in the volume of business transacted. Tickets issued by these companies ordinarily entitle the purchaser or his family to a fixed compensation in case of his injury or death. But probably the most familiar form of accident insurance is that which promises the holder of a policy a stipulated sum in case of death by any accident, or a weekly compensation during disability from such cause. The ordinary general accident insurance policy, besides allowing for a limited weekly indemnity while recovering from injury, specifies various amounts payable upon loss of members of the body, as, for instance, loss of two eyes $5,000, loss of either hand or foot $2,500, loss of both hands or both feet, $5,000, etc. Personal accident policies are frequently combined with those covering health insurance, which grants a weekly sum to the insured during incapacity for work because of sickness. This combination is usually styled "disability insurance." The age of the insured is usually limited to the period between eighteen and sixty-five years. In the early days of accident insurance, premiums charged were identical for all risks accepted, without consideration of age or occupation of the subject, but differentiation and classification were soon found necessary. To-day each company engaged in general accident insurance bases its premium on a table of classified occupations, which has been devised and made possible through a comparison of the experiences of the various companies during many years. Characteristic of the age in its application of the insurance idea is the wholesale insurance of the employer against liability to the employed for accidental injuries sustained in his service. This was begun by the Employers' Liability Assurance Corporation of London, founded almost immediately after the passage of the Employers' Liability Act by Parliament, in 1880, when employers were made more liable for injuries to workers than previously recognized by law. The expense of such insurance usually comes out of the aggregate wages, but represents only a trifling percentage. This business of employers' liability insurance has attained wide popularity both in England and in the United States. A similar form of collective insurance is that covering elevator accidents, based on the legal liability of owners of elevators, in which the company insures owners of buildings against the claims of persons injured in their elevators, whether employees or passengers, and makes periodical inspection of all elevators insured. Other variations of this class of in-

surance are those which assume the liability of proprietors for accidents happening in their theaters or of factory owners, contractors, and others, for casualties on their premises.

Damage to property forms a large class of casualty insurance, and its various extensions have led to strange offices. Plate-glass insurance is one of the oldest of this character and has been a most attractive field for promoters; ordinary breakage or fracture is insured against except in cases of fire, when it is usually covered by fire insurance. There are corporations that make boiler-explosion accidents their special line of insurance, their policy agreeing to indemnify the insured against damage to property and personal injury or loss of life by aforesaid explosion. Such companies have every insured boiler thoroughly inspected by trained engineers periodically while their policies are in force. There are also a few fire insurance companies making a specialty of insuring farm buildings against loss or damage by fire and lightning; likewise policies are issued against tornado and wind-storm risks; and there are some associations of farmers, on the mutual plan, that insure certain grades and kinds of cattle and standing crops against loss or damage from specified causes. Another branch of the insurance business which has developed within recent years to considerable importance, known as fidelity or surety insurance, is that which guarantees an employer for the faithful performance of clerk, public officer, or other individual requiring bonds. The insurance of titles to real estate has also become a business of ever-widening scope, while insurance against burglary, first attempted by way of experiment, seems to promise important development in the future. According to the "Insurance Year Book," in 1906 there were 124 casualty and miscellaneous insurance companies in this country. The aggregate figures representing the financial standing and transactions of these classes of companies for the four years 1903-06, as presented in the "Insurance Year Book," were as seen in the foregoing table.

ARTHUR L. J. SMITH.

SUMMARY OF BUSINESS DONE BY STOCK CASUALTY AND MISCELLANEOUS INSURANCE COMPANIES IN THE UNITED STATES

Year	Number of Companies	Capital	Total Assets	Liabilities (Including Capital)	Net Surplus Over Capital and Liabilities	Total Premium Receipts	Total Income	Total Payments to Policy Holders	Dividends to Stockholders	Actual Expenses of Management (Including Taxes)	Total Expenditure
1906	124	$50,258,625	$160,546,677	$120,515,482	$40,013,195	$64,423,449	$78,167,255	$24,876,764	$3,172,589	$32,287,310	$62,898,321
1905	95	43,629,911	152,866,216	113,795,952	39,070,264	55,343,813	63,190,680	21,646,844	2,877,942	28,922,468	54,353,325
1904	82	38,017,182	110,852,706	82,563,921	28,288,784	49,467,118	55,685,447	19,332,539	2,570,287	26,282,811	48,610,492
1903	73	36,893,700	100,130,231	71,220,687	28,910,544	43,672,646	49,716,644	16,679,975	2,371,282	22,699,734	42,941,991

In 1910 the casualty insurance in force in the United States included: Personal accident and health, $4,200,000,000; employers' liability, $1,800,000,000; fidelity, $1,000,000,000; surety, $1,000,000,000; burglary, $60,000,000; and credit, $45,000,000.

Insurance, Fire. Though this form of indemnity was vaguely known and crudely practised in some European cities in the first half of the seventeenth century, it was not until the great fire of 1666 had swept over London that its value began to be discerned and discussed. Public interest led to practical measures, and in May, 1680, a private fire office was opened in London to insure houses at 2½ per cent. of the yearly rent for brick houses and 5 per cent. for frame houses. This rate was considered too high, and within a year the citizens of London were clamoring for municipal control of fire insurance, a movement which the common council voted for, but which the courts decided against. In 1684 the first English mutual company was organized under the name of the Friendly Society, each member paying an entrance fee for expenses, and making a cash deposit which was held in reserve for emergencies; each entrant also agreeing to share an equal assessment for current losses. With this association began that rivalry between the proprietary and the mutual systems which has continued unabated down to the present time. Before 1720 the business of fire insurance had become established upon a firm basis in many cities throughout Europe, though it was not generally recognized in the United States until several decades later. In fact, until well into the nineteenth century, despite several attempts to organize fire insurance companies in this country, the in-

habitants of the various communities were content with their practice of contributing whatever amount each could afford in defraying a neighbor's loss by fire. This is all the more noteworthy when the fact is realized that since 1860 the business of fire insurance has increased more in the United States than in any other country, and since 1880 has kept pace with the phenomenal development of wealth and commercial activity.

TOTAL FIRE AND MARINE INSURANCE TRANSACTIONS IN THE UNITED STATES

Description	Stock Companies	Lloyd's	Mutual Companies	Year Ending Dec. 31	Capital	Total Assets, Exclusive of Premium Notes	Net Surplus	Net Premiums	Total Income	Paid for Losses	Paid for Dividends	Paid for Expenses	Total Disbursements
Grand Totals : (630 Cos. & Lloyd's)	338	35	257	1906	$84,290,590	$554,331,113	$176,942,570	$301,038,893	$350,223,127	$278,173,623	$24,211,689	$104,498,039	$406,883,351
Grand Totals : (612 Cos. & Lloyd's)	327	37	248	1905	76,138,021	550,166,135	215,411,355	273,795,169	296,562,588	126,446,017	23,293,581	94,040,419	243,780,017
Grand Totals : (550 Cos. & Lloyd's)	303	35	212	1904	72,068,831	502,081,526	189,626,054	259,788,521	281,228,402	152,803,405	21,889,364	87,950,370	262,643,139
Grand Totals : (563 Cos. & Lloyd's)	324	37	202	1903	72,989,977	483,813,418	187,366,755	241,402,905	261,431,401	113,874,595	20,105,802	81,360,615	215,341,002

On January 1, 1910, there were reported 322 stock companies (including 38 Lloyds) ; 272 mutual companies : total capital, $87,501,299 ; assets, $659,451,677 ; premiums, $328,981,691 ; income, $362,082,354 ; losses paid, $154,099,782 ; dividends paid, $30,154,845 ; all disbursements, $300,133,154 ; surplus, $238,981,691.

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Modern fire insurance business may be conveniently divided into its two principal classes, one comprising the stock companies which control and conduct the larger part of the business, the other taking in mutual companies, the plan of which has attracted some insurers and projectors, especially in manufacturing districts. Briefly, a policy of fire insurance may be defined as a contract wherein, upon consideration of a small amount, the insurer pledges himself to pay a large sum on an event not likely to happen to the insured. The consideration or premium is paid wholly in advance for a term of years. Generally on the face of the policy are printed the conditions specifying with accuracy valid and void circumstances under which said policy is issued and held. Companies are not liable for loss caused directly or indirectly by invasion, insurrection, riot, civil war or commotion, military or usurped power, or by order of any civil authority; by theft; by neglect of the insured to use all reasonable means to save and preserve the property at and after a fire or when the property is endangered by fire in neighboring premises; or (unless fire ensues, and in that event, for the damage by fire only) by explosion of any kind, or lightning; but liability for direct damage by lightning may be assumed by specific agreement. In case an insured building or any part of it falls, except as a result of fire, all insurance of both building and contents immediately ceases. Companies are not liable for loss to accounts, bills, currency, deeds, evidences of debt, money, notes, or securities; nor, unless liability is specifically assumed in a policy, for loss to awnings, bullion, casts, curiosities, drawings, dies, implements, jewels, manuscripts, medals, models, patterns, etc. The period during which an insurance may be in force ranges from a few days, when goods are temporarily stored, up to three, five, ten years, or even a perpetual insurance is possible. Because many fire insurance companies in the United States assume risks to ships at sea, and, on the other hand, marine insurance organizations cover fire damages, the business results of the two are generally summed up together. Statistics in the United States for the four years 1903-06, according to the data compiled for the "Insurance Year Book," were as shown in the accompanying table.

These figures do not include hundreds of town and country mutuals whose transactions are purely local and of small volume, but do include mutuals having $15,000 cash assets or over. It may be mentioned here, before closing the subject, that 1906 was an extraordinary year in the business of fire insurance, owing to the earthquake which practically destroyed the city of San Francisco on April 18, causing fire damages amounting to many millions of dollars of

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insurance. It is estimated that the companies have paid (1907) on account of the San Francisco conflagration $185,000,000 to $200,000,000. ARTHUR L. J. SMITH.

Insurance, Life. Among the ancients it was customary to make guesses at the probable length of life for the purpose of valuing or commuting life estates, leases, or annuities. Crude computations of the number of years' purchase such interests were worth may be found in Roman law and in a number of mediæval manuscripts. But actual life insurance is supposed to have had its origin in the marine branch of the business, when merchants accompanying their vessels on trips of traffic provided against capture at the hands of pirates by agreeing to pay a premium to an underwriter, who in turn agreed to furnish ransom in case of capture. From this simple beginning grew the complicated system of life insurance which to-day is recognized as a science. It is significant that the first important approach toward a scientific valuation of hazards was in connection with the class of risks concerning human mortality. What may be called the earliest table of mortality was prepared by John Graunt, of London, in 1661, but his object was purely a scientific one, without any practical purpose. A far more important mortality table was made by Edmund Halley, in 1693. Halley also discovered its use in calculating the values of life contingencies.

Though so-called policies of life insurance are known to have been made in the sixteenth century, they were regarded as mere wagers, a form of gambling which was frequently forbidden by various governments, and until 1699 they all appear to have been underwritten by individuals. In that year was established, in London, The Society of Assurance for Widows and Orphans, on an immature assessment plan, providing that 2,000 healthy men, under fifty-five years of age, should each pay 5s. as entrance fee, 1s. quarterly for expenses, and 5s. at the death of a fellow member; at his own death a member's estate was to receive £500, less 3 per cent. This association lasted about eleven years. Meanwhile, in 1706, had been founded an organized life insurance institution, under the name of The Amicable Society for a Perpetual Assurance Office, with a subscription list of 2,000 members, each paying an entrance fee of 10s. and an annual subscription of £6 4s. But the real history of English insurance begins with the organization of the Equitable Life Assurance Society, in 1762, and with the labors of Thomas Price, who in 1780 constructed the Northampton Table of Mortality, which was adopted by that society, and by many subsequent insurance companies. This table made a profound impression on the general public, and was long regarded as a true guide to the expectation and duration of life. Another actuarial table of considerable importance was that published by Joshua Milne in 1816, called the Carlisle Table of Mortality, which was the standard table for many years in Great Britain; in fact, it is used yet, though generally supplanted by later and more appropriate tables, especially those prepared by the British Statistical Office under William Farr and his successors, and known as English Life Tables. The system of tontine (*q. v.*) has been applied to life insurance in various ways.

The history of life insurance in Great Britain from the latter part of the seventeenth century has been one of gradual growth. In 1867 a list was published of over 350 life insurance companies that had been organized in Great Britain, but many of these were "bubble" concerns. Nearly half the population of Great Britain is insured in some form. According to the Board of Trade returns for 1909 the ordinary companies received in premiums £26,862,882; paid claims, £19,147,918; added to funds, £2,696,239; and had total life and annuity funds, £320,537,275. The industrial companies received in premiums £13,097,109; paid claims, £5,177,337; added to funds, £2,699,194; and had total life and annuity funds, £37,783,759.

In the United States life insurance has attained a greater relative importance among financial institutions than in any other country, and constitutes a peculiar phenomenon in regard to its extraordinary development during the last half of the nineteenth century, for it was not until the close of the Civil War that it began its amazing career. As late as 1852 there were but fifteen life insurance companies in this country, and their entire assets amounted to little more than $7,900,000. The returns of these companies, as collected in the first annual report of the insurance commissioner of Massachusetts, made in 1855, indicate that the business at that time was in an exceedingly undeveloped condition, both as to volume and method. Massachusetts was the first State to insist (1855) upon an official supervision of all insurance business transacted within its limits by companies chartered there, and the newly created department adopted the Actuaries' Table of Mortality, based on the experience of seventeen English companies. This establishment of a State insurance department vesting the entire control of all insurance business in the State, with the enactment of special laws for the management of the companies, placed the institution on a firmer footing than it had previously enjoyed, and gave the public the necessary confidence to invest money. New York (1859) and other States followed the example set by Massachusetts, until now every State in the Union has an insurance department governed by its respective code. The various codes, however, have introduced

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into the insurance business an element of complexity that has been one of the strongest arguments in favor of substituting Federal supervision for State control.

In the United States ordinary insurance companies are distinguished as stock or proprietary, mutual, and mixed companies, as to organization; and level premium, natural premium, and assessment companies, as to system of operation. A stock company is one organized on the cash capital subscribed by its projectors. The capital is held as a pledge for the payment of the policy holders' claims while premiums are accumulating, and as the liabilities are limited to the aggregate amount of policies in force, it is necessary to provide only a sum sufficient to meet these liabilities. No policy holder has any voice in the management of the company, nor any share in the profits of its business. A mutual company is one constituted by persons who are themselves insured, who corporately insure others, and who as policy holders control the management by electing directors from among themselves, and receive in various forms the annual profits. As these companies are organized without any capital, it is necessary that they should accumulate more quickly than stock companies a fund to meet liabilities; hence they charge premium rates in excess of the amount that will really effect the insurance; namely, a reserve element, a mortality element (together constituting the net premium), and the loading, or expense element, which is an addition to the real cost of insurance to provide for operating expenses and an occasional excess of mortuary loss. A mixed company is a company organized with a stock capital, in which policy holders have no managing voice, and which does or does not yield them a share in the profits according to their form of insurance, mutual or stock.

As to system of operation, a company doing business on the level premium basis requires advance payment of premiums, makes a contract with the insured, indicating in it the exact sum payable to the beneficiary, and keeps the premiums level, or the same each year of the paying period, except where they may be reduced by dividends. A company doing business on the natural premium system requires advance payment of premiums, draws up a contract with the insured, indicating in it the exact sum payable to the beneficiary, insures only for one year or part of a year—three or six months—giving a policy renewable from time to time at the option of the insured without further medical examination, and charging a progressive premium—a premium that increases each year beyond the rate of the preceding year, but may be reduced somewhat by dividends. Every life premium under the level premium system is composed of the reserve, mortality, and expense elements, while every life premium under the natural premium system excludes the first of these elements. A company conducting business on the assessment system classifies its members by age periods, fixes a different rate of assessment or premium for each class, and calls assessments either for a single death, a specified number of deaths, at specified intervals of time, or when the amount of money on hand falls below the aggregate of immediate liabilities or existing claims.

Life insurance companies issue many kinds of policies, but they are usually variations of one or more of the three principal types: (1) Ordinary or whole life policies, with premiums continuing through the life of the insured, the insurance being payable only at death; (2) limited term policies, with premiums limited to a certain number of years, the insurance payable only at death; (3) endowment policies, the premiums in which are limited to a term of years, the insurance being payable at death if occurring during the term of the policy, or to the insured in case he is living at the expiration of the term. For calculations of premium rates in the United States the Actuaries' Table of Mortality, first adopted, has been generally superseded by the American Experience Tables compiled by Sheppard Homans (1870) from the experience of the Mutual Life Insurance Company of New York. It is noteworthy that the rate of interest used in calculation has declined from 5 to 3½ and 3 per cent.

A class of this business deserving special attention is that called industrial insurance, with a weekly premium of five cents or multiples thereof, so arranged for convenience to small wage-earners and their families, every member being insurable. Introduced into the United States in 1875, industrial insurance has attained remarkable growth, fully one-sixth of the population having invested in it. Of 20,936,565 level premium life insurance policies outstanding in the ninety American companies Jan. 1, 1905, 15,678,310 were industrial policies. At that time policies averaged about $140. A peculiar and unsatisfactory feature of industrial insurance is that it requires larger premiums on given amounts than does ordinary insurance, thus compelling the poorer people to pay the highest rates. Americans pay more than double the price for such insurance that is paid in England. Several European governments, especially those of Germany, Austria, and Switzerland, have laws for compulsory insurance for the laboring classes; but this great social experiment, while relieving want and reducing pauperism, tends to stifle independence of spirit and to burden national industry.

The most sensational developments hitherto known in connection with life insurance occurred during the investigation

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of the conduct of certain leading companies in New York by a legislative committee in 1905. To detail the scandals brought to light would serve no essential purpose here; it is only necessary to say that they revealed many evidences of mismanagement and malfeasance—misappropriation and illegal use of moneys, etc.—on the part of faithless officers of the companies, as well as of laxity, if nothing worse, in the administration of the State insurance department. The more flagrant abuses were promptly checked by legislation, and public confidence, which had been seriously impaired, was gradually restored. As the companies chartered in the State of New York transact a large percentage of the life insurance of the country, the legislative measures for protection of policy holders were far-reaching in effect. The disclosures of the New York investigation forcibly demonstrated the necessity of stricter governmental control in this field of enterprise. As the evils discovered by the inquiry of 1905 were mainly attributable to the deferred dividend form of insurance, New York companies were forbidden by the new statutes to write such policies after Jan. 12, 1907, and were required to provide in every policy issued after that date that the proportion of the surplus accruing upon the policy shall be ascertained and distributed annually and not otherwise. Policies must also contain the entire contract between the company and the persons taking them out, and all statements by the insured are to be deemed representations, not warranties. Life insurance companies desiring to organize on the mutual plan in New York can do so without capital stock, provided that at least 500 persons subscribe for at least $1,000,000 of insurance and each pay in one annual premium, and provided that the company deposit $100,000, as do stock companies, with the superintendent of insurance. While in the mutual companies the policy holders had always nominally had the right to vote for trustees and directors, they had little or no voice in the management. Therefore a most important law was enacted providing for the filing of complete lists of policy holders of mutual companies, the nomination of policy holders' and administration tickets, and a complete method for the voting of policy holders either in person, by mail, or by proxy. Meetings must be held annually to elect new boards of directors. Through these provisions policy holders have power to control their companies. Other effective reforms were: Limitation of the amount of new insurance which a company may write annually; limitation of expenses; the requirement that all salaries over $5,000 shall be fixed by the full board of directors and not by a committee; more detailed vouchers for disbursements; standard forms of policies; annual reports giving much more minute and detailed information than ever before; and restriction of investments.

The full import of this legislation may be realized by considering how vast is the aggregate business of the insurance companies of this country. According to the "Statistical Abstract of the United States" for 1909, the insurance returns in the United States for 1908 were as follows: Ordinary policies, 6,164,730, amounting to $11,850,032,581; industrial policies, 19,687,675, amounting to $2,668,919,696—totaling 25,852,405 policies and $14,518,952,277; total income, $703,930,149; total payments to policy holders, $335,777,925; total assets, $3,399,347,246; total liabilities, $2,925,344,468; total surplus, $474,002,778. Writings on the various forms of insurance in English are usually technical in character, but general and reliable information may be had by consulting: Walford, "Insurance Cyclopædia" (1871-80); "Cyclopedia of Insurance in the United States" (annual); and Young, "Insurance."

Insurance, Marine. This form of insurance, though probably far more ancient in its beginnings (see INSURANCE), is said by Villani, the Italian historian, to have originated among the Lombards in 1182. In Portugal and Flanders it appears to have been established commercially before 1300. A Pisan ordinance of 1318 mentions it, and in the Florentine statute of 1523 is found the earliest known form of policy. Both Italy and Flanders have been credited with the introduction of marine insurance into England, the probability being that it was introduced there by the Lombards in the first half of the sixteenth century. So far as known, the earliest policies issued in England (1547-48) were written in Italian, the subscriptions being in English, but no policy in English thus far known dates earlier than 1555. At that period the ratio of losses to voyages and the risks assumed in various seasons and for different classes of craft were already carefully, though crudely, studied in order to establish a basis for customary rates. The underwriters were private individuals acting independently, but usually they succeeded in conducting the business with a degree of intelligence that made it yield them a sufficient profit.

For many years marine insurance transactions were carried on in open market, the premium rates being there determined, but toward the end of the seventeenth century the development of the modern system began with the meetings of merchants at Lloyd's coffee house in London (see LLOYD'S). The Lloyd's policy, used in Great Britain and the United States, contains blanks for the name or names of the insured, the description and value of the property insured, name of the ship, master's name, beginning and termination of the risk, the voyage, and the

ports at which the vessel may touch and remain. It also specifies the maritime perils —dangers incidental to or consequent on the navigation of the sea—wind and wave, stranding, collision, fire, jettison, war, pirates, rovers, thieves, captures, seizures and restraints, detainments of kings, princes, and peoples, barratry, etc. The policy does not cover losses due to ordinary causes—wear and tear—nor those, for example, arising through damage done by the insured to another vessel, or from attempting to run a blockade, or from an embargo laid upon the ship. Policies are very specific in matters of detail, and no part of a marine insurance contract is more important than that pertaining to the conditions known as warranties. A warranty is a stipulation or engagement on the part of the insured that the facts in relation to the risk are as stated by him. Warranties are either express or implied. These conditions are absolute, and breach of warranty voids the contract.

Policies are of several classes in regard to form, the ordinary form being the "voyage" policy, covering a specified voyage between two ports. A "time" policy covers any voyage within a specified time. In a "valued" policy the value of the ship or cargo is stated and is the measure of damages in case of total loss. An "open" policy is one in which the value of the vessel or goods is not fixed, the amount of indemnity in case of loss depending on the value ascertained. In a policy of this form the subject of insurance is not restricted, and other property may be added. Under these different forms of policies marine insurance is ordinarily made to cover ships, cargoes, freights, and in some cases the profits expected from a voyage. If failure to realize the expected profits be due to causes covered by the policy, the insured may obtain indemnity.

About 75 per cent. of the marine insurance of the world is written in Great Britain by proprietary or mutual companies and by associations of individual underwriters, chief among which is Lloyd's. Some of the larger shipping companies conduct their own underwriting. Owing to changed business conditions and to the monopoly of the carrying trade by the English, marine insurance has steadily declined in America since the middle of the nineteenth century. Now at least half of it is written by American branches of foreign companies. Rates of insurance have also lowered with the transformation of the ocean carrying service. As high as five or six per cent. was charged for insurance in the days of the old clipper and packet sailing ships, while now rates are as low as three-quarters and even two-tenths of one per cent.

Insurance, National, a system of insurance carried on by certain governments, as by that of Great Britain on lives, inaugurated in 1865. It has never attained to anything like rivalry with the business of great companies, no regular paid agency being employed by the government. In New Zealand the practice of private companies in employing canvassers has been followed in government insurance, and from the institution of the department in 1874 business grew rapidly. National insurance on a large scale is conducted by the German government, which from 1883 has had a law providing for the compulsory insurance of workmen against sickness. In 1889 a law was passed under which the working classes on disablement from sickness, accident, or old age become entitled to a pension.

Insurance Patrol, an organization in some cities identical with or similar to a salvage corps (*q. v.*).

Insurrection, organized or active resistance to civil authority; actual rising against government. It may or may not be preceded or accompanied by the more secret acts of sedition, and it may stop short of acts that constitute open rebellion, which aims at overthrowing a government. The term insurrection may be used either in a good or a bad sense, according to the nature of the power against which it is directed. What in its initial stage is distinctly to be characterized as insurrection may become general and grow into a rebellion, which, when successful, may be dignified with the name of revolution. Law, both national and international, deals specifically with such outbreaks, and many insurrectionary movements have formed important episodes in the development of constitutional history. The Constitution of the United States, Art. I., Sect. 8, clause 15, gives Congress the power to call forth the militia to suppress insurrections. Acts were passed in 1792, 1795, and 1807, giving the president power to call forth the militia when notified by an associate justice of the Supreme Court or a district judge that the execution of the laws is obstructed, and on application of a legislature or a governor, when the legislature could not be convened, and to employ also the land and naval forces of the United States. The Whiskey Insurrection (*q. v.*) was directed against the Federal authority and President Washington used force to suppress it on notification by the Federal judge. During the "Buckshot War" (1838) between the Whigs and Democrats in Pennsylvania, the governor of that State asked for assistance, but it was refused. The governor of Rhode Island made a similar application during Dorr's Rebellion (see DORR, THOMAS WILSON), and the regulars were held ready for action, but their aid proved unnecessary. These last two cases came under Art. IV., Sect. 4, of the Federal Constitution, which provides that the United States shall protect each State "on application of the legislature,

or of the executive (when the legislature cannot be convened), against domestic violence."

When the Civil War began, President Lincoln had to take prompt measures for calling out the militia, though no application had been made to him as required by the acts of 1792 and 1795. His action was justified by Art. II., Sect. 3, of the Constitution, providing that "he shall take care that the laws be faithfully executed," but Congress on Aug. 6, 1861, formally validated and made legal all Lincoln's previous acts, proclamations and orders. The "Force Bill" of April 20, 1871, gave the president power to call forth the militia and to employ the forces of the United States to suppress disorders intended to deprive any portion of the people of their constitutional rights, even if the State authorities should be unwilling to restore order. During the reconstruction period Federal troops were called for in all the States that had seceded, except Georgia and Florida, to preserve the peace, which had been disturbed by attempts to overthrow the newly established republican administrations in those States. During the railroad strikes in 1877 Federal troops were employed in Pennsylvania and in Baltimore, and also in the great Pullman strike of 1894.

Integral Calculus, a branch of mathematics, the converse of the differential calculus. Having a given or known differential, the integral calculus has for its object to find a function such that, being differentiated, it will produce the given differential. Such expression is called the integral of the differential. The operation of finding the primitive function or integral is called integration. Besides the method of finding the integrals of given differentials, the integral calculus is also applied to various branches of mathematics, as well as to almost every branch of natural philosophy and engineering.

Intellect, the thinking part of the mental constitution. Mind is made up of three elementary constituents—emotion, volition, and intelligence. When we experience pleasure or pain we are said to feel, a condition which is referred to the emotions; when we act to obtain the one or escape the other, we exert our will; when we remember, compare, or reason, intelligence is brought into play. The powers or properties of the intellect have been variously classified. Reid's classification is perception by the senses, memory, conception, abstraction, judgment, reason. To these Stewart adds consciousness, attention, imagination, and the association of ideas. Sir William Hamilton adopted the following division into six faculties: (1) The presentative faculty, or the power of recognizing the different aspects of the world without and the mind within (external perception, self-consciousness). (2) The conservative faculty, or memory proper, the power of retaining impressions to be subsequently reproduced as occasion demands. (3) The reproductive faculty, the means of recalling the dormant impressions into consciousness. (4) The representative faculty, or imagination, which determines the greater or less vividness of the impressions or ideas thus reproduced. (5) The elaborative faculty, or power of comparison, by which classification, generalization, abstraction, and reasoning are effected. (6) The regulative faculty, or the cognition of the *a priori* or instinctive notions of the intellect, as space, time, causation, necessary truths, etc. This is equivalent to what the German philosophers called *Vernunft* (reason), as contrasted with *Verstand* (understanding), which deals with experienced or contingent truth.

Other classifications are called memory, reason, and imagination, which is, if not the most correct, the most popular. The classification adopted by Bain is: (1) Discrimination, or the consciousness of difference. (2) Retentiveness, the property whereby impressions once made persist after the fact, and can be afterward recovered without the original cause and by mental forces alone. (3) Similarity or agreement. These three properties, in combination with emotion and volition, he holds are adequate to explain all the recognized faculties. Memory is almost a pure case of retentiveness, aided now and again by similarity; perception by the senses is only another name for discrimination; and judgment is either discrimination or similarity, according as it discovers difference or agreement in the object.

Intercalar, or **Intercalary,** in chronology, used of months, or shorter periods of time, inserted into the calendar to make the astronomical and civil years more nearly coincide. At an early period the Romans intercalated two months into their year, which had hitherto consisted of 10 months only. Numa intercalated a month every second year, and as the time for doing so was unfixed, the Pontifices placed it at such times as might suit the convenience of the government or of their own friends.

Intercolumniation, in architecture, the space between two columns. When columns are attached to the wall, this space is not under such rigorous laws as when they are quite insulated; for, in the latter case, real as well as apparent solidity requires them to be near each other, that they may better sustain the entablatures they carry. The different intercolumniations are known as Pycnostyle, Systyle, Diastyle, Aræostyle, and Eustyle. In the Doric, however, the intercolumniation is regulated by the disposition of the triglyphs in the frieze; for the triglyphs ought always to be placed over the center of a column, and the metope

should be square. In the Tuscan interval, the architraves being of wood, the space may be considerably extended. Columns may be said to be either engaged or insulated; when insulated, they are either placed very near the walls or at some considerable distance from them. With regard to engaged columns, or such as are near the walls of a building, the intercolumniations are not limited, but depend on the width of the arches, windows, niches, or other objects, and the decorations placed within them. But columns that are entirely detached, and perform alone the office of supporting the entablature, as in peristyles, porches, and galleries must be near each other, both for the sake of real and apparent solidity.

Intercommuning, Letters of, an ancient writ issued by the Scotch Privy-council warning persons not to harbor rebels.

Interdict, in old Roman civil law, a decree of the prætor pronounced between two litigants sometimes enjoining, but more frequently prohibiting, something to be done. The interdiction of any one from fire and water — *i. e.*, from obtaining those necessaries — at Rome was tantamount to banishment from the city.

In Roman Catholic ecclesiastical law and history, an ecclesiastical censure by which persons are debarred from "the use of certain sacraments, from all the divine offices, and from Christian burial." It is a commingling and development of the New Testament excommunication with the interdict of the Roman prætor. It could be directed against prominent individuals, kings, for instance, or against localities as small as a parish or as large as an empire. Interdicts seem to have commenced with bishops in the 9th century (see HILDEBRAND; HINCKMAR). On March 23, 1208, Pope Innocent III. placed England under an interdict which was not removed till Dec. 6, 1213. On Dec. 17, 1538, Pope Paul III. published a bull excommunicating and deposing Henry VIII., and placing the kingdom under an interdict. Various other interdicts were sent forth. The Canon Law gradually introduced mitigations in the severity of interdicts. Baptisms and confirmations might be administered to persons in danger of death; penance was open to all but those who had caused the issue of the interdict; marriage was permitted, but without solemnities; faithful ecclesiastics might be buried in the churchyard, but in silence; priests might be ordained if there were not enough previously; there might be Low Mass every week, and High Mass at the five great festivals of Christmas, Easter, Whitsunday, Corpus Christi, and the Assumption. In April, 1606, Pope Paul V. placed the republic of Venice under an interdict which was met by determined and effectual resistance from the government, and soon afterward interdicts fell into disuse.

Interdict, in Scotch law, an order issued by the Court of Session to stop or prohibit a person from doing an illegal or wrongful act. The party applying for it must have both title and interest to object to the act complained of — *i. e.*, he must be more than a mere stranger. The principles on which it is granted in Scotland are substantially the same as those in which the parallel writ of injunction is granted by English and American courts.

Interest, an allowance made for the use of borrowed money. The money on which interest is to be paid is called the principal. The money paid is called the interest. The principal and interest, taken together, are called the amount. The ratio of the principal to the interest, per annum, is the rate or rate per cent. Interest is either simple or compound. Simple interest is the interest on the principal during the time of the loan. Compound interest is the interest, not only on the principal but on the interest also, as it falls due. The amount of interest legally obtainable varies in the States and Territories of the United States, according to the laws of the respective States. New York has no limit on call loans of $5,000 and up, and no claim for usury can lie there on such loans. Out of the 49 States and Territories there are 38 which have a legal limit of interest, the remaining 11 being allowed to charge any sum obtainable by contract.

TIME AT WHICH MONEY DOUBLES AT INTEREST.

Rate per cent.	Simple Interest.	Compound Interest.
10	10 years.	7 years 100 days.
9	11 " 40 days	8 " 16 "
8	12½ "	9 " 2 "
7	14 " 104 da.	10 " 89 "
6	16 " 8 mo.	11 " 327 "
5	20 "	14 " 75 "
4½	22 " 81 da.	15 " 273 "
4	25 "	17 " 246 "
3½	28 " 208 da.	20 " 54 "
3	33 " 4 mo.	23 " 164 "
2½	40 "	28 " 26 "
2	50 "	35 " 1 "

Short Method for Calculating Interest.— Multiply the principal by as many hundredths as there are days, and

For	4	per cent. divide by	90.
"	5	" "	72.
"	6	" "	60.
"	7	" "	52.
"	8	" "	45.
"	9	" "	40.
"	10	" "	36.
"	12	" "	30.

Example.—Interest on $50 for 30 days at 4 per cent.: $\$50 \times 30 = \$15.00$, which divided by $90 = 16\frac{2}{3}$ cents — the required result.

The exaction of interest was prohibited in England in 1197, and again in 1436. It was legalized, the rate being fixed at 10 per

cent., in 1545, prohibited in 1552, restored in 1570, and reduced to 3 per cent. in 1713. A law passed on Aug. 10, 1854, removed all restrictions on its amount.

In law, chattel real, as a lease for a given number of years, or a future estate; also any estate, right, or title in realty.

Interference, in farriery, the act of interfering or striking the hoof, or shoe of one hoof, against the fetlock of the opposite leg, so as to break the skin or injure the flesh. In physics, the mutual action, in certain circumstances, of two streams of light or air, vibrations of sound, undulations of waves, etc., coming in contact so as to affect each other (used especially of light). Interference of light in optics, the mutual action which two luminous rays exert on each other when the undulations meet in different phases. If two very small holes are made near each other in the shutter of a dark room, two divergent luminous cones will result. If caught on a white screen fringes will appear where they overlap. The same effect is produced if the light from a luminous point of any kind be received on two slightly inclined mirrors, or two prisms, so as to cause the rays to encroach on each other. It is due to all the series of waves reinforcing each other wherever they coincide in phase, and extinguishing each other where the phases are contrary. The same effects are produced more gorgeously by polarized light, and by the interference of the two sets of waves reflected from the two surfaces of a thin film, as of a soap-bubble.

Interfretted, in heraldry, interlaced; a term applied to any bearings linked together, one within the other, as keys interlaced in the bows, or one linked into the other.

Interim, various temporary arrangements during the Reformation struggle of the 16th century. One published by the Diet of Ratisbon, July 29, 1541, was to be in force till a General Council met. The Augsburg Interim, which was sent first by Charles V., and was read before the Diet of Augsburg, May 15, 1548, was intended to reconcile the Catholics and Protestants, an object in which it failed. That prepared under the auspices of the Saxon Elector Maurice, Dec. 22, 1548, was called the Leipsic Interim. In it Melanchthon and various other Protestant theologians treated of "things indifferent" and the extent to which the Interim of Charles V. might be accepted. See ADIAPHORISTS.

Interior Department, one of the executive departments of the United States government. Its functions are indicated in the following duties of its chief: The Secretary of the Interior is charged with the supervision of public business relating to patents for inventions; pensions and bounty lands; the public lands and surveys; the Indians; education; the Geological Survey and Reclamation Service (irrigation work); the Hot Springs Reservation, Arkansas; Yellowstone National Park, Wyoming; and the Yosemite, Sequoia, and General Grant parks, California, and other National parks; distribution of appropriations for agricultural and mechanical colleges in the States and Territories; and supervision of certain hospitals and eleemosynary institutions in the District of Columbia. He also exercises certain powers and duties in relation to the Territories of the United States.

Interlaken (in'ter-lä-ken) ("between the lakes"), a village of Switzerland, in the beautiful valley of the Aar, between Lakes Thun and Brienz. Along the Walnut Avenue or Highway between the lakes there is an almost uninterrupted line of hotels and boarding-houses. The village is visited annually by 20,000 to 30,000 tourists, who make it their starting-point for reaching many of the most wonderful sights that the country affords, especially the Bernese Oberland, where are the Staubbach, Lauterbrunnen, the Grindelwald glaciers, etc. The nucleus of the village is a former Augustinian monastery (founded 1130).

Interlineations, in a deed, additions or corrections written either on the margin or between the lines. In England interlineations in a deed are not fatal, provided only it is proved that they were made before executing the deed. It is usual to put the parties' initials opposite the place where the interlineations occur, in proof of this, or at least by way of memorandum. In affidavits and other documents the initials should also be put at the places interlined. In Scotland interlineations ought to be signed by the parties, and the fact mentioned in the testing clause, otherwise it will be presumed that the interlineations were made after the execution, and will vitiate the deed.

Interlocutor, in Scotch law, a finding or judgment of a judge or court in a cause.

Interlude, in music, a short melodious phrase played by the organist (generally extempore) between the verses of a psalm or hymn tune. It is now in disuse in England. In French cathedrals a long interlude is played between the verses of the "Magnificat." In the German Protestant Church an interlude (*Zwischenspiel*) is often played between each line of the verse. Examples of its artisitc use may be found in Mendelssohn's "Elijah" ("Cast thy burthen") and "St. Paul" ("Sleepers, wake").

Intermediate State, the state of the soul between death and the resurrection.

(For Jewish views on the subject, see HADES.) Christian opinions on the subject may be reduced to two: one that there is a place distinct from both heaven and hell in which disembodied souls are kept till the resurrection (see HADES: LIMBUS: PURGATORY), the other that the souls of the righteous at death, becoming perfect in holiness, immediately pass to heaven, while those of the wicked, now beyond the power of being regenerated, go to hell in anticipation of the judgment day. The Greek and the Roman Church hold the first opinion, while the Calvinistic or Puritan theology accepts the latter view. The most notable controversy on the subject of an intermediate state was that raised by some discourses of Pope John XXII. in the 14th century.

Intermezzo (-met'zō), in music, an interlude; a short composition of a lively character played between the parts of a more important work, or between the acts of a drama, etc.

Intermittent Fever. See AGUE.

Internal Improvements. From the beginning of the United States government till 1860, the question of a system of internal improvements carried on by the general government was a party question. The Republican (Democratic-Republican), and after it the Democratic party as the party of strict construction, opposed such a system. Improvements, the property in which remains in the general government, as lighthouses, etc., were not opposed, but improvements on rivers and roads, the benefit of which passes to the States, were the objects of attack. Most of the earlier States were on the sea-coast, and the improvement of their harbors was at first carried on by means of tonnage taxes on the commerce of the port, levied with the consent of Congress (see Constitution, Article 1, section 10, clause 3). But a tax on tonnage is a tax on the consumer of the goods carried in the vessel, and the growth of inland States rendered it unjust thus indirectly to tax them in the price of articles consumed, in order to improve the harbors of the sea-coast States, and though this practice was, in isolated cases, continued till the middle of the 19th century, it was generally discontinued much earlier. As early as 1806 the improvement of roads by the National government was conceived in order to indemnify the interior States, and in 1823, the improvement by the National government directly of rivers and harbors was begun. The Republican (Democratic-Republican) Presidents, Jefferson, Madison, and Monroe, opposed these improvements as unconstitutional, though toward the end of his term Monroe became more favorable to the system. John Quincy Adams was a warm advocate thereof and Jackson its stern opponent. Though the Democrats opposed any general system of improvements, they continued to apply funds to particular purposes. The Whigs now adopted the system originated by the Democrat, Jackson, viz., the distribution of the surplus among the States. But once did the Whigs attempt to put this into execution, and then, in 1841, the veto of President Tyler, at odds with his party in Congress, put an end to that scheme, which has not since been revived. The introduction of railroads has partly done away with the question of improvements for roads, while a system of assistance to the railroads, by means of the grant of land along the line of their route, has sprung up. These grants have been made to many railroads in new sections of the country; enormous tracts, in several cases between 40,000,000 and 50,000,000 acres, being so granted. From this policy a revulsion has set in and the present tendency is to the recovery of as much of the land so granted as has not been earned by a strict compliance with the terms of the grant. To this both of the great political parties stand committed.

Internal Revenue, the moneys collected under the internal revenue bureau in the Treasury Department of the United States. The term includes most of the receipts from national taxes, except customs duties; but as commonly restricted it does not embrace receipts from the sale of public lands, patent fees, postal receipts, etc., which are really sources of internal revenue. Taxes are apportioned among the States only in proportion to the population. The first internal revenue tax was by act of March 3, 1791, which provided for a tax on distilled spirits of domestic manufacture, discriminating in favor of those produced from domestic materials, and against those produced from foreign materials. The enforcement of this act led to the Whisky Insurrection in 1791. In 1794 taxes were levied on carriages, retail selling of wines and foreign distilled liquors, on snuff, sugar and sales at auction. In 1797 taxes were laid on stamped vellum, parchment and paper. In 1798 the first direct tax of its kind, one of $2,000,000, was apportioned among the States, and it was proposed that it should be levied on dwelling-houses, slaves and land. The tax of 1791 was levied to establish the principle of national taxation; that of 1794 from fear of hostilities with England; that of 1798 because of the threatened war with France. On Jefferson's accession to the presidency, and on his recommendation, all internal taxes were repealed in 1802, and no others were authorized till 1813. Then the war with England necessitated an increased revenue and most of the old taxes were reimposed. These were to cease a year after the close of the war, for the maintenance of

which they were levied; but they were afterward continued for a while for the payment of the national debt. In 1814 increased need of money led to an augmentation in the amount of these direct and other internal taxes, and to the first imposition of taxes on domestic manufactures other than sugar, snuff and spirits, such as iron, candles, hats, playing-cards, umbrellas, beer, ale, harness, boots, plate, household furniture, gold and silver watches, etc. The return of peace brought the abolition of direct taxes, excise duties and other internal taxes, and from 1818 to 1861 none of these were levied.

The Civil War forced a renewal of the internal revenue system, and in 1861 a direct tax of $20,000,000 was apportioned among the States, though it was not collected till a year later. On July 1, 1862, an exhaustive internal revenue act was passed, levying taxes on all sorts and kinds of articles too numerous to mention, on trades, incomes, sales, manufactures, legacies, etc. The bill was ill-considered and needed frequent modifications. More than 25 acts on the same subject were passed within the next six years. A few industries were taxed out of existence, but all were more or less disturbed. However, enormous revenues were raised and the people submitted without opposition to the necessities of the case. Extensive reductions were made after the war had ceased by various acts in 1866, 1867 and 1868. Further reductions were made in 1872, when, among others, stamp taxes, except that of two cents on checks, drafts and orders, were abolished. Various acts since 1872 have reduced the subjects of internal revenue taxation to their present numbers, tobacco, spirits, fermented liquors, bank circulation and, by Act of Aug. 2, 1886, oleomargarine. By the Revenue Act approved June 13, 1898, special taxes were levied to meet the expenses of the war with Spain. Among the articles taxed under this act were, fermented liquors, tobacco, snuff, bonds, debentures and certificates of stock issued after July 1, 1898, agreements of sale, bank checks, drafts, bills of exchange, insurance policies, proprietary medicines, etc. The total receipts of the Bureau of Internal Revenue from 1863, the date of its creation, to June 30, 1903, was $6,590,900,996. The stamp tax, so far as it affected bank checks, express receipts, promissory notes, etc., was abolished to take effect July 1, 1901. The total collections in the fiscal year ending June 30, 1910, aggregated $289,728,114.

International, the recognized contraction for a society of which the full title was The International Working Men's Association. It owed its being to Karl Marx, the author of "Capital," and was founded at a meeting held in St. James' Hall, Sept. 28, 1864, under the presidency of Prof. E. S. Beesley. Two Parisian workmen, Henri Tolain, a chaser in bronze, and Eugène Fribourg, a decorative engraver, attended as delegates for their fellows. Mr. George Odger was elected president, and a German tailor, Eccarius, secretary. Statutes and a general manifesto, drawn up by Karl Marx, were issued. Of the manifesto Professor Beesley says: "It is probably the most striking and powerful statement of the workman's case as against the middle class that has ever been compressed into a dozen small pages." The first congress met at Geneva, Sept. 3, 1866. About 60 delegates, chiefly French and Swiss, were present, and the subjects discussed were: (1) International combination of efforts by the agency of the Association in the struggle between labor and capital, (2) limitation of the hours of the working day, (3) juvenile labor, (4) coöperative labor, (5) trades unions.

The congress was ignored by the London papers, and the reports intrusted to Jotteaux, a Swiss naturalized in England, for conveyance to London, were taken from him by the Imperial Police as he crossed the French frontier, but afterward restored on the intervention of Lord Stanley, then Foreign Secretary. The next congress was held at Lausanne in the following year, and the "Times" published lengthy reports of its proceedings. In that year the International kept foreign workmen out of the labor market in England in case of strikes. In 1868 the Paris Association was dissolved by judicial proceedings, but individual members kept up their connection with the parent society, which was victorious in a contest with the master-builders of Geneva; and in Germany 120 societies sent representatives to Nuremberg, and affiliated themselves. The third congress was held at Brussels in September of that year, and its discussions on war, strikes, machinery, instruction, credit, property, and the reduction of the hours of labor, formed the subject of four editorials in the "Times." The Social Democratic Centers at Vienna, Pest, and Presburg sent delegates to Brussels. The fourth congress was held at Bâle in September, 1869, and on Dec. 13, the day of the opening of the Reichstag, 40,000 workmen assembled in the streets of Vienna, demanding that a bill should be brought in legalizing trade combinations; numbers were arrested and imprisoned. In this year Bakunin joined the association, and his influence soon became apparent. In 1870 the members of the Committees of Paris, Lyons, Marseilles, Toulouse, Brest, and Rouen, were sentenced to terms of imprisonment, but were released on the proclamation of the Republic. The International now separated into two parties. At The Hague Congress, in 1872, Bakunin's, or the extreme

party, was outvoted by the followers of Marx, who transferred the seat of administration to New York. After the Geneva Congress, in 1874, the International proper ceased to exist. Bakunin's party lingered till 1879, and then formed an alliance with SOCIALISM (*q. v.*). The general aims of the International were the abolition of wage-paid in favor of associated labor, to be developed to national dimensions by national means, the abolition of private property in the means of production, and their reversion, with land, to the State.

International Law, the name given by Bentham to what had previously been called the Law of Nations. It arose gradually during the latter part of the Middle Ages, when commerce and navigation, not very flourishing during the prevalence of the feudal system, began to revive with its decline. At first it took the form of commercial usage, then it was promulgated in "royal ordinances," and finally became tacitly recognized as commercial law. Then it was extended to all international transactions, even though not commercial. It is divided into three departments: the principles that should regulate the conduct (1) of States toward each other; (2) of private parties arising out of the conduct of States to each other; (3) of private parties as affected by the separate internal codes of distinct nations. Its leading principles are three: (1) that every nation possesses an exclusive sovereignty and jurisdiction in its own territory; (2) that no State or nation can by its laws directly affect or bind property out of its own territory, or persons not resident therein, natural born subjects or others; (3) that whatever force the laws of one country have in another depends solely on the municipal laws of the latter.

Interpleader, in law: (1) One who interpleads. (2) The pleading or discussion of a point incidentally arising, as it were, between or in the middle of a case, before the principal cause is determined. Interpleader is allowed that the defendant may not be charged to two severally where no fault is in him; as where one party brings detinue against the defendant upon a bailment of goods, and another against him upon trover, there shall be interpleader to ascertain who has right to his action.

International Law, Progress of. Nothing could better exemplify the fallacy of drawing from present ills despondent prophecies of evil than a comparison of the state of international law at the close of the 19th century with its condition at the beginning. The wars in the midst of which the century opened were not only world-wide in their effects, but they were characterized by a defiant disregard and systematic violation of the rules of international conduct. As early as 1793 both France and Great Britain, soon after the war broke out between them, sought to interrupt the lawful course of neutral trade. With this object each power adopted measures the injurious effects of which were greatly aggravated by the irregular and arbitrary manner in which they were executed.

The peace of Amiens proved to be but a brief truce, and after the war was renewed even greater excesses were perpetrated. The idea of conquering England by destroying her trade, though it did not originate with Napoleon, was the inspiration of his so-called Continental system. On March 28, 1806, Prussia, after taking possession of Hanover, published, in pursuance of her agreement with Napoleon, a proclamation which purported to close the ports of the North Sea, as well as all rivers running into it, against British ships and trade. The British government sought to retaliate by an Order in Council which declared the mouths of the Ems, the Weser, the Elbe, and the Trave to be in a state of blockade. Napoleon then issued his famous Berlin decree, by which he assumed to blockade the British Isles, and to prohibit all commerce and correspondence with them. Great Britain's response was an Order in Council not only forbidding neutral vessels to trade between ports in the control of France or her allies, but also forbidding them to trade, without a clearance obtained in a British port, with the ports of France and her allies, or with any port in Europe from which the British flag was excluded. Napoleon's answer was the Milan decree, declaring every vessel that had submitted to search by an English ship, or consented to a voyage to England, or paid any tax to the English government, and every vessel that should sail to or from a port in Great Britain or her possessions, or in any country occupied by British troops, to be denationalized and to be good prize. By these measures the right of neutrals to hold commercial intercourse with belligerents was virtually denied, each belligerent endeavoring under the guise of blockades, which existed only on paper, to prevent all trade that could not be made subservient to its interests. It is hardly conceivable that any power would now venture to assert such pretensions. They were at the time scarcely defended on legal grounds; and in the declaration of Paris of 1856, to which both France and Great Britain are parties, it is expressly recorded that "blockades, in order to be binding, must be effective." This rule is recognized as but the expression of a principle of international law. The illegality of paper blockades is today universally acknowledged.

No less important than the subject of neutral rights is that of neutral duties. The first authoritative formulation of the duties resulting from a state of neutrality

is to be sought in the executive, legislative, and judicial acts of the United States in 1793 and 1794, during the first series of European wars growing out of the French Revolution. But on the foundations then laid there has been built up in the past 100 years an elaborate and well-regulated system, the obligatory character of which is not now questioned. The comprehensive neutrality statute of the United States of April 20, 1818, became in the following year the model of an act of the British Parliament. From time to time laws and regulations were adopted by other governments, and the duties of neutrality became a determinate part of international law. The final vindication of the system as the ultimate standard of international obligation and responsibility was made in the case of the Alabama claims.

In the discussion and practice of neutrality, rules have naturally been formulated as to what constitutes a state of belligerency, and as to the conditions under which it should be recognized. The recognition of belligerency presupposes the existence of a state of war in the international sense, and necessarily implies that the parties to the conflict may exercise toward each other and toward third powers such rights as war gives. But on or near the border line that divides peace from war there stands pacific blockade, a measure of recent invention, the precise legal position of which has not been authoritatively determined.

During the first half of the 19th century a fruitful subject of controversy was that of visitation and search. That belligerent cruisers might lawfully visit and search the merchant vessels of neutrals on the high seas, for the purpose of enforcing the observance of the laws of war, was on all hands admitted; but in certain cases, as in that of the impressment of seamen, the belligerent right of search was sought to be employed for other purposes; and it was even asserted that a right of search existed in time of peace, especially for the purpose of putting an end to the slave trade. These pretensions were vigorously resisted, especially by the United States. In 1858 the Senate unanimously resolved:

> "That American vessels on the high seas, in time of peace, bearing the American flag, remain under the jurisdiction of the country to which they belong, and therefore any visitation, molestation, or detention of such vessels by force, or by the exhibition of force, on the part of a foreign power, is in derogation of the sovereignty of the United States."

"After the passage of this resolution," said Mr. Fish, as Secretary of State, "Great Britain formally recognized the principle thus announced, and other maritime powers and writers on international law all assert it."

It would be difficult to overestimate the importance, both theoretically and practically, of the establishment in the 19th century of the freedom of vessels on the high seas from visitation and search in time of peace. It was the acknowledgment of this principle that made the seas really free and gave freedom to commerce. Nor does the freedom of the seas become less important with lapse of time. As a principle it grows rather than diminishes in the estimation of mankind; for, in the light of history, its evolution is seen to mark the progress of commerce from a semi-barbarous condition, in which it was exposed to constant violence, to its present state of prosperous security.

Closely related to the principle of the freedom of the seas is the question of the navigation of the narrow channels by which they may be connected. This question has been discussed in respect to natural channels in several cases, the most notable of which was that of the dues charged on vessels and their cargoes passing through the Danish Sound and Belts. By treaties made with the interested powers in 1857, Denmark relinquished the dues, the powers paying her once for all a lump sum, in consideration not only of her renunciation to tolls, but also of her agreement to maintain such lights, buoys, and pilot establishments as the trade of the Baltic might require. An artificial channel necessarily involves special considerations. Its construction requires the expenditure of money and gives rise to proprietary rights; and it is not denied that those rights may be asserted by the exaction of tolls. In this respect the navigation of the artificial channel obviously cannot be free. But, though it cannot be said that the subject has been authoritatively settled as a part of international law, a tendency has been shown in the case of great international highways to act on analogies and to make the artificial channel free in the sense that it shall be open to the ships and merchandise of all nations on equal terms.

While the right freely to navigate the seas has been established, a great advance has been made toward assuring the free navigation of waters flowing into the sea, in cases in which they wash in their navigable course the territory of two or more States. By the treaty of Vienna of June 9, 1815, it was agreed that rivers which separated or traversed two or more States should, along their whole navigable course, be, in respect of commerce, entirely free to everyone, subject to regulations of police. This principle was applied primarily to the Rhine, but was also expressly extended to the Neckar, the Main, the Moselle, the Meuse, and the Scheldt. With a limitation of the right of free navigation in some instances to the citizens or subjects of the riparian powers, similar stipulations may be found in treaties relating to the rivers

and canals of the ancient kingdom of Poland; to the Elbe, Po, Pruth, Douro, Danube, and other rivers in Europe; and to the rivers La Plata, Paraguay, Uruguay, St. Lawrence, Yukon, Porcupine, and Stikine in America. By an imperial decree of Dec. 7, 1866, the government of Brazil opened "to vessels of all nations," after a certain day, the Amazon as far as the frontiers of Brazil; the Tocantins, as far as Cametá; the Tapajos, as far as Santarem; the Madeira, as far as Borda; the Negro, as far as Manáos; and the San Francisco, as far as the city of Penedo.

The principle of freedom, which has been so widely extended in commerce and in navigation, has also been acknowledged in matters of government. Such an acknowledgement may be seen in the established rule that new States and new governments are entitled to recognition on the ground of their *de facto* existence. The old theory of legitimacy and divine right found its last practical assertion in the acts of the powers composing the Holy Alliance, who, in their various circulars, associated "revolt and crime," denounced "as equally null, and disallowed by the public law of Europe, any pretended reform effected by revolt and open force," and announced their determination "to repel the maxim of rebellion, in whatever place and under whatever form it might show itself." Their acts corresponded with their words; but they were soon forced by the progress of events to abandon their ground, and to admit in practice the principle which they had condemned.

In the last 100 years there has been witnessed a change in the law relating to the acquisition of territory by occupation. In former times, when so large a part of the world was unsettled, great weight was given to the mere fact of discovery. Under the papal bull of 1493, and the treaty of Tordesillas of the following year, Spain and Portugal sought to divide between themselves on that ground the whole unknown world. Even the early English charters asserted the British title to extend from the Atlantic to the Pacific. In the 19th century, and particularly in the latter half of it, the powers have, especially in respect to territorial claims in Africa, recognized more clearly than was ever done before the necessity of actual and effective occupation as the basis of permanent national title.

In the system of extradition, which is chiefly the development of the 19th century, we find one of the many evidences of the growth among nations of a clearer perception of the duty of promoting common social ends. In former times there existed a strong repugnance to the surrender of fugitives from justice. This was due partly to the ancient idea of asylum, partly to perverse notions of national dignity, but perhaps in largest measure to ignorant and groundless prejudices. It was not, indeed, until the middle of the century that the great expansion of the system may be said to have begun. Since that time, however, its growth has been rapid and far-reaching.

An increasing tendency to acknowledge the force and supremacy of law may be seen in the growing frequency of arbitrations for the settlement of disputes between nations, not only as to the rights of individuals, but also as to their own rights, as well as in the recent efforts to establish a permanent system of arbitration, as proposed in the plan of the International American Conference, in the unratified treaty between Great Britain and the United States, and in the convention adopted at The Hague. During the 19th century there were, exclusive of cases still pending and incomplete, at least 136 international arbitrations. Probably there were more, though certain lists lately circulated, by which the number appears to have been vastly greater, are quite inaccurate, since they include not only numerous cases of mediation, but also ordinary boundary surveys, domestic commissions, and even pure diplomatic negotiations. Both in the number of arbitrations and in the importance of the questions involved in them, the United States and Great Britain easily lead the way.

There are two modes in which international law may be developed. The first is the general and gradual transformation of international opinion and practice; the second is the specific adoption of a rule of action by an act in its nature legislative. The operation of the former mode it is often difficult to follow in its details, but its effects are potent and undeniable. Perhaps its clearest and most definite exposition may be found in the recent opinion of the Supreme Court of the United States in the case of the Spanish fishing-smacks, the "Paquete Habana" and the "Lola" (the "Paquete Habana," 175 U. S. 677). The particular point decided was that coast fishing-vessels, with their implements and supplies, cargoes and crews, unarmed and honestly pursuing the peaceful calling of catching and bringing in fresh fish, are exempt from capture as prize of war. In reaching this conclusion, the court considered the question whether the exemption was merely a matter of "comity," or whether it was a matter of legal right to which the court was bound to give effect. In behalf of those who sought the condemnation of the vessels there was cited an opinion of Lord Stowell, in which it was said to be "a rule of comity only, and not of legal decision." With reference to this statement, Mr. Justice Gray, who delivered the opinion of the Supreme Court, said:

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"The word 'comity' was apparently used by Lord Stowell as synonymous with courtesy or good will. But the period of a hundred years which has since elapsed is amply sufficient to have enabled what originally may have rested in custom or comity, courtesy or concession, to grow, by the general assent of civilized nations, into a settled rule of international law. As well said by Sir James Mackintosh: 'In the present century a slow and silent, but very substantial mitigation has taken place in the practice of war; and in proportion as that mitigated practice has received the sanction of time, it is raised from the rank of mere usage and becomes part of the law of nations.'"

The importance of this judicial declaration, in its bearing on the development of international law, it is difficult to overestimate. Even the most eminent judges have seemed at times to labor under the impression that it was somehow the peculiar prerogative of a remote age to fix by its customs, however rude and barbarous they may have been, an immutable law in comparison with which the practices of modern times are merely "comity" or "courtesy," which may be discarded at will. The enlightened declaration of the Supreme Court, which was the very foundation of its decision, should have a potent effect in clearing away the misconceptions on which many well-known dicta, of an opposite effect, are founded.

The 19th century is, however, specially distinguished for the modification and improvement of international law by what may be called acts of international legislation. Among the sources of international law the publicists commonly enumerate the stipulations of treaties. Where a certain rule of action is uniformly embodied in a succession of treaties between the leading powers of the world, it assumes in course of time the character of a principle of international law. But in the 19th century, immediate and important results have been directly produced by means of international conferences.

Allusion has already been made to the effort of the Congress of Vienna to establish the free navigation of international rivers as a general principle. By the same congress an important contribution to international law was made in the form of rules to regulate the rank and precedence of diplomatic agents. By those alone who are familiar with the annals of diplomacy can the delicacy and interest of this subject be fully appreciated. It had probably given rise to more disputes and caused a greater waste of time than any other within the whole range of international relations. The rules of the Congress of Vienna, slightly modified by the Congress of Aix-la-Chapelle in 1818, were accepted by all the powers which then composed the international circle. They divide diplomatic agents into four classes: (1) Ambassadors, legates, and nuncios, who, in a sense, specially represent the person of the sovereign. (2) Envoys, ministers, or other persons accredited to sovereigns. (3) Ministers resident, accredited to sovereigns. (4) Chargés d' affaires, accredited to ministers for foreign affairs.

Yet more remarkable as an act of legislative aspect was the declaration on maritime law made by the Congress of Paris of 1856. The declaration embraced four rules:

(1) Privateering is and remains abolished.

(2) The neutral flag covers an enemy's goods, with the exception of contraband of war.

(3) Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag.

(4) Blockades, in order to be binding, must be effective, that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy.

The fourth rule may, as has heretofore been observed, be considered as merely declaratory of international law; for publicists had ceased to defend the paper blockades of the Napoleonic era. The third rule may also be classed as declaratory, since it was generally observed in the absence of a treaty stipulation to the contrary. But by the first two rules it was proposed to give the character and force of law to principles which had previously been obligatory only where they were made so by express treaty. This element in the situation was acknowledged in the declaration itself, in which the signatories announced their purpose to invite the adhesion of other powers with a view "to establish a uniform rule." The powers invited to adhere embraced practically all those within the sphere of international law; and, with the exception of the United States, Spain, and Mexico, they accepted the declaration in its entirety. Those three powers objected to the naked inhibition of privateering, but the United States offered to go further and exempt private property at sea altogether from capture, save in the cases of contraband and blockade. All the powers, however, approved the second rule and it has since been regarded as a principle of international law. It was expressly so announced by the United States and Spain at the outbreak of the recent war between them. The exemption from capture of private property at sea was one of the subjects discussed by the recent conference at The Hague.

Since 1860 numerous attempts have been made by means of international conferences to legislate on the modes of conducting warfare. On August 22, 1864, there was concluded at Geneva the famous convention for the amelioration of the condition of the wounded in armies in the field, commonly called the Red Cross Convention. Almost all civilized powers have adhered to this convention, and the observance of its pro-

visions is considered a test of civilization. Agreements and declarations have also been made as to the nature of the weapons that may be used in war, and as to the treatment of prisoners of war. In this relation we should specify the declaration of St. Petersburg of 1868, which was framed by an international military commission. Far more extensive, covering almost the whole field of the laws of war on land, is the project of declaration of the Brussels Conference of 1874, which, though the powers represented in the conference failed afterward to make it binding, forms the basis not only of the "Manual" formulated by the Institute of International Law in 1880, and of the plan of convention adopted by the Spanish-Portuguese-Latin-American Military Congress at Madrid in 1892, but also of The Hague Conference rules concerning the laws and usages of war.

Notice should also be taken, as contributions to the development of international law, of the efforts made in the 19th century, outside international conferences, to codify various branches of international law, and especially the laws of war. In this particular the 19th century should not withhold its tribute to the 17th, which, even though its earlier wars were distinguished by barbarities, may yet claim as its own Gustavus Adolphus and his humane code. Nevertheless we find in the recent acts of various governments a marked advance toward a more comprehensive system. The publication by the United States in 1863 of instructions for the government of armies in the field set an example which has had a stimulating effect. In July, 1870, ample instructions were issued by the French government to its naval officers. Russia in 1877 during the conflict with Turkey, issued to her soldiers a catechism founded on the project of the Brussels Conference, besides prescribing liberal rules for the treatment of prisoners of war. In 1894 after the outbreak of the war with China, Japan promulgated a comprehensive prize law, based on the works of jurists, the conclusions of the Institute of International Law in 1882, and the French naval instructions of 1870, and setting the salutary example of abolishing the interest of the individual captor in the prize. In the recent war between the United States and Spain, each belligerent issued systematic instructions for the government of its army and navy, and the Secretary of the Navy of the United States has since prescribed, with the President's approval, for the use of that branch of the service, a Naval War Code, which purports to embody the laws and usages of war at sea.

In the recent development of international law, much influence has no doubt been exerted by unofficial societies, the activity of which has specially marked the

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second half of the century. In the case of the Red Cross Convention, the original impulse proceeded from such an association. The Institute of International Law (Institut de Droit International), and the International Law Association, formerly known as the Association for the Reform and Codification of the Law of Nations, are leading examples of societies, unofficial in constitution but international in membership, which are devoted to legal progress.

Besides improving the general rules of law, nations have during the past 100 years made great progress in securing by coöperation common interests, the attainment of which can be assured only by special agreements. The tendency toward coöperation may be seen in the treaties, of which the convention signed at Brussels July 2, 1890, may be mentioned as the leading example, made for the purpose of putting an end to the African slave trade. It may also be observed in the adoption, as the result of the Marine Conference at Washington, in 1889–1890, of uniform rules of navigation.

In 1883 a number of powers of Europe and America entered into an international union for the protection of industrial property, and various governments which were not among the original parties have since adhered to it. In the following year a convention was made between 26 States for the protection of submarine cables outside territorial waters. Only two years later, on Sept. 9, 1886, a treaty was concluded at Berne for the protection of property in literary and artistic work. To this treaty, which is commonly called the International Copyright Convention, the United States was not a party; but it may perhaps be said that a step toward its acceptance was taken in the act of Congress of 1891, by which foreign authors and artists were for the first time enabled to copyright their works in the United States as well as at home. One should also mention as measures of coöperation the various international agreements that have been made in recent times for the regulation and protection of fisheries on the high seas.

By the process of national consolidation, which specially marks the latter half of the 19th century, international relations have been profoundly affected. Multitudes of petty States, with diverse interests and claims to distinction, have been absorbed into great national organizations. If international relations have not, in consequence of this absorption, lost any of their seriousness and importance, they have in a sense become more simple, and the possibilities of international coöperation, whether for the improvement of law or the protection of common interests, have increased. But while the situation has thus been sim-

plified, there has also been a significant widening of the circle in which are included the States that acknowledge the obligations and enjoy the advantages of international law. As the law of nations was originally the product of the Christian States of Europe, nations were classified, with reference to its acceptance and rejection, as Christian and non-Christian. With the admission of Turkey, by the treaty of Paris of 1856, "to participate in the advantages of the public law and concert of Europe," this classification ceased to be accurate. Lately we have witnessed a further enlargement of the circle by the admission of Japan. The admission of those States to the concert of nations does not signify that the standards of international law have been altered or abandoned. On the contrary it denotes a more general acceptance of those standards as the test of advancement in law, in morals, and in civilization. JOHN BASSETT MOORE.

Interstate Commerce Law, The. It is seldom that an act of Congress touches so closely the life of the people as does the interstate commerce law. The great transportation systems that have grown up out of the necessities of the vast inland trade of the United States are, unlike the railroads of Europe, under private control. They have acquired enormous wealth and corresponding power, which they have not always used in a way to be commended. Frequent and well-grounded complaints from all sections of the country resulted in congressional action. On Feb. 4, 1887, the national Legislature passed the bill now known as the interstate commerce law, which went into effect April 5. It applies in the main to the "trunk line" railroads, and its authority rests on the constitutional right of the central government "to regulate commerce between States." The law was the fruit of an attempt to remove the inequalities of freight and passenger rates, which had become an evil, and most of its provisions are calculated to abolish abuses. No free passes may be issued except to postal agents and regular officials of railroads. No reduced rates to special classes of travelers may be granted. This clause affects commercial travelers, theatrical companies, baseball nines, and other itinerant organizations or individuals who have heretofore paid less than the ordinary fare; but the prohibition does not apply to ministers of the Gospel. Freight rates were disturbed more than any others. Some roads practised systematic discrimination in their charges. A great corporation often paid at a low rate for its vast business, while the small shipper was crushed by a much higher charge for transportation. It was difficult to discover and abolish such arrangements, and smaller concerns had to suffer. The interstate commerce law was intended to end this abuse. But the most important feature of the act is embodied in what is known as the "short-haul clause." On certain railroad lines in competition with water routes it has been customary for land carriers to make a reduction in freight charges, in order to secure traffic which would otherwise fall to the slower but cheaper canal and steamboat lines. A good example of the "long and short haul principle" is found in England, where American products may reach London by one of two principal routes: by steamer direct, or by steamer to Liverpool, and thence by rail to London. Railroads carry foreign freight between these two cities for less than their regular charges for half the distance. Otherwise no freight at all would go by way of Liverpool. Such an arrangement naturally causes dissatisfaction among the merchants of the way stations, who pay more for the "short haul" to London than their brother merchants in Liverpool pay for the "long haul" (the whole distance to Liverpool). In America hundreds of instances could be found in which railroads made this distinction between through and local freight. The new law forbade the distinction, and, as a consequence, the rates of through transportation were increased. But the first act of the Interstate Commerce Commission was to suspend the "short-haul" clause for 90 days in the case of certain roads, which protested that they would be ruined by its operation, on account of the cheap water routes which are open to their patrons. The Interstate Commerce Commission consists of seven members appointed by the President, each drawing a salary of $10,000 a year.

Interstitial Absorption, in pathology, gradual absorption of the molecules of some part of the body. It is one of the results of inflammation. It is seen in bone with obliteration and absorption, also in the granular contracted kidney, cirrhotic or gouty, and in the tissues of the liver and lungs. It precedes the extension of inflammation to pus, as when an abscess points, when the pus is moving in a distinct course toward the mucous or cutaneous surface of the part affected, this resulting from interstitial absorption of the tissues involved.

Intertrigo (-trī′gō), a slight inflammation of the skin occurring in the hollows of folds of the integuments or joints, where two surfaces lie in contact with each other, also called chafing, fretting, galls. Treatment, wash carefully with white castile soap, and then apply cold cream, zinc ointment, or a lotion (calomel 1 dram, lime-water ½ pint, called "black-wash").

Interval, in music, the distance between any two sounds. Intervals when confined within the octave are simple, when they exceed it they are compound. The interval of a whole tone, as from C to D, is called a second, of a whole tone and a semitone, as from C to E flat, a minor third, etc.

Intestacy, the state of a person who has died without testing, *i. e.*, without leaving a will. If no will, or deed equivalent to a will, is executed, or if a will executed is invalid from defect or form, then an intestacy occurs, and the law provides an heir or next of kin, in lieu of the owner himself doing so. See HEIR.

Intestine (Latin, *intestinum*, from *intus*, within), the name given to the convoluted membranous tube extending from the stomach to the anus, which receives the ingested food from the stomach, retains it for a longer or shorter period, mixes it with the bile, pancreatic juice, and intestinal secretions, gives origin to the lacteal or absorbent vessels which take up the chyle and convey it into the current of the blood, and which, lastly, conveys the fecal or indigestible products from the system. The intestines are contained within the cavity of the abdomen, and from their comparative size and caliber, as well as from structural conformation, are divided into the large and small intestines. In man the small intestine, consisting of the duodenum, jejunum, and ileum, extends from 16 to 26 feet in length; the duodenum is about 12 inches, two-fifths of the remaining length is made up of the jejunum, and the ileum forms the rest. Three distinct coats are to be distinguished in the structure of the small intestine; these, named from without inward, are known as the serous, muscular, and mucous coats. In connection with the mucous coat the following structures are to be noted: Firstly, the *valvulæ conniventes*, or closely folded transverse plaits, largest in the duodenum, numerous in the jejunum, and finally disappearing near the middle of the ileum. These plaits or folds appear to serve materially to increase the digestive surface of the intestine, to ensure the slow and gradual passage of the food through the canal, and lastly to thoroughly mingle the ingesta with the secretions. The villi constitute the next structure of importance. The villi are exclusively found in the small intestine, and are most numerous in the duodenum. Each villus, when microscopically examined, is found to be simply an outstanding process of the mucous membrane, supported by a delicate inner network of fibrous tissue, and covered outwardly by a layer of "columnar epithelium" cells, which repose on a so-called "basement membrane."

Internally the villus contains an artery which gives off minute ramifications through its structure, and a vein is also to be noted by which the venous blood is returned. And lastly the lacteal or absorbent vessel enfolded in a muscular layer is found in the interior of the villus. As the chyle or fluid product of digestion passes along the intestine, propelled by the peristaltic action of the intestinal walls, it is pressed against the villi, the outer cells of which are believed to possess a selective power, and by these cells the chyle is transmitted to the lacteal vessels within the villi, and through these absorbent vessels is ultimately carried to the current of the blood. The glands of the small intestine consist of three varieties, two named after their respective discoverers, Lieberkühn and Brunner. The third variety, though called glands, are lymph follicles. They occur singly scattered up and down the small and large intestines, and are then called the "solitary glands" of the large and small intestine. In certain situations, however, they occur in groups, and are then known as the "agminated glands," or glands of Peyer. The glands of Lieberkühn occur uniformly throughout the mucous membrane of the small and large intestines; while Brunner's glands are confined to the duodenum. Lieberkühn's glands, largest in the rectum, secrete the intestinal juice, whose exact function is not accurately known. Peyer's glands occur on the side of the intestine farthest from its attachment to the mesentery. The Peyer's patches measure from one to three inches in length, and the separate glands of which each is composed are seen to consist each of a little oval sac or follicle imbedded in the submucous tissues of the gut, but extending also, as a rule, through the whole thickness of the mucous layer, and projecting beyond the line of the general surface. They average about three-fourths of a line in diameter. Each gland is further surrounded by a capsule of blood vessels, which appear to enter the substance of the gland. Each little oval body consists of a mass of adenoid tissue, which is composed of an exceedingly delicate reticulum or network of connective tissue, in the meshes of which are great numbers of round cells, white in color and with one or more nuclei. These cells are indistinguishable from white blood corpuscles or from lymph cells. They exist in such numbers as almost entirely to obscure the reticulum in which they lie. This fine connective tissue and round cells have been called "lymphatic elements," and indeed the structure of these so-called glands of the intestine is, in its essence, identical with that of lymphatic and mesenteric glands, and with that of the spleen and other organs usually classed as blood glands. These glands of the intestine have, like the blood glands, no duct; and it is quite certain that they possess no secretory

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function. In typhoid fever Peyer's glands are the seat of a peculiar and specific ulceration, which forms at once one of the marked symptoms and characteristic dangers of that disease, since the ulceration may eat its way through the whole thickness of the bowel wall, and lead to hemorrhage by opening into blood vessels, or inflammation of the abdominal cavity by the escape into it of contents of the bowel. Brunner's glands, found only in the duodeum, occur in the submucous layer of the intestine. Each gland is a minute lobulated structure, consisting of a large number of minute vesicles, which terminate in a duct opening on the intestinal mucous surface.

The duodenum lies in the epigastric region, and ascending as high as the gall bladder it descends in front of the right kidney, and terminates after crossing the spine at the level of the second lumbar vertebra. It makes three turnings, and between its first and second flexure receives, by a common opening, the bile duct (*ductus communis choledochus*) and the pancreatic duct. The conversion of the chyme from the stomach into chyle is thus accomplished in the duodenum. The jejunum, commencing at the left side of the second lumbar vertebra, becomes insensibly and gradually continuous with the ileum, this latter portion of the intestine being less vascular than the jejunum. The jejunum and ileum together make many convolutions, and are attached to the backbone and supported by a broad fold of the peritoneum, known familiarly as the "web," and scientifically as the "mesentery." The jejunum was so named from its being generally found empty after death (Latin, *jejunus*, empty); and the ileum, terminating the small intestine, becomes continuous with the large intestine in the right iliac fossa — or the hollow of the haunch bone of the right side. Here we find the ileum opening into the colon, or first portion of the large intestine, which is known by its constricted or sacculated appearance, and by the presence of a valve dividing the small from the large intestines, and known as the ileo-cæcal valve, or as the valve of Tulipius. Below the point at which the ileum opens into the colon we find a short blind sac continuous with the colon, and known as the cæcum or *caput coli;* and attached to the lower extremity of the cæcum, and communicating with the cæcal cavity, we find a little closed tube, to which the name of appendix vermiformis is applied. This little process is about three inches in length, and as thick as an ordinary quill. It may be coiled up behind the cæcum itself, or may depend loosely into the pelvis. The cæcum and its appendix vermiformis thus form in reality the first partition of the large intestine. We next find the colon to ascend in the right lumbar region, in front of the kidney. This portion is known as the ascending colon. It then crosses the abdominal cavity to the left side, and becomes the transverse colon; and finally descends as the descending colon, in front of the left kidney into the left groin where, after making a curve like the letter s — sigmoid flexure of the colon — it terminates in the last portion of the intestinal tract. This last portion is known as the rectum, and is so named from its somewhat straight disposition, although the bowel at this part adapts itself to the curves of the sacrum upon which it lies. The rectum finally terminates in the anus. The large intestines measure from 5 to 6 feet in length; the small intestines together measure from 16 to about 24 or 26 feet in length; so that the entire intestinal tract in the human body may be regarded as being about five or six times the length of the body itself.

The constricted or sacculated appearance of the large intestines has already been referred to. This appearance is caused by the contraction and shortening of the longitudinal muscular fibers of the gut. The three coats of the small intestine are repeated in the large intestine, a variation in the disposition of the longitudinal muscles giving rise to the sacculated appearance just referred to. The large intestines are also known by the presence of small fatty bodies termed *appendiculæ epiploicæ,* attached to them by portions of the peritoneum. The function of these bodies is entirely unknown. The mucous or inner coat is not elevated to form villi in the large, as in the small intestine, and only two kinds of glands are to be distinguished in the large intestine. These are the glands of Lieberkühn and the lymph follicles or solitary glands, the structure of which has already been described. The functions of the tubular glands of Lieberkühn, so far as is known, have been already indicated. Some degree of digestion probably goes on in the large bowel, effected by the secretion from the Lieberkühnian glands. The function of the large bowel is, however, chiefly excretory, that is the large intestine serves as a means of conveyance from the system of the indigestible parts of the food. But there can be no doubt that a certain power of absorption is also exercised by its mucous surface. The food is propelled along the entire intestinal tract by the alternate contraction of the longitudinal and circular muscular fibers, by which means it is gradually pushed along the tube with what is known as a vermicular or peristaltic movement.

The ileo-cæcal valve serves to prevent regurgitation of matters into the small intestine, after they have passed into the colon. The valve is composed of two crescentic flaps of mucous membrane, arranged

so as to inclose a transverse slit between them. The muscular fibers of the ileum are continued on to the cæcum and its valve; and when the cæcum and colon are distended, the margins of the folds of the valve are brought closely together, so as to close the central and included aperture, and thus effectually to prevent the escape of matters backward into the ileum.

The mesentery is the term given to the fold of peritoneum by means of which the small intestines are attached to the spine. It exhibits various folds and dispositions, which, however, are too technical to admit of popular description. The blood-vessels supplying the intestinal tube are the superior and inferior mesenteric arteries and their branches, derived from the abdominal aorta. The veins of the intestines empty their contents into the vena portæ, which distributes itself through the liver, and from the blood of which the bile is secreted by the hepatic or liver cells. The nerves of the intestines are derived from the eighth pair and intercostal nerves, and the sympathetic or ganglionic system of nerves is also intimately concerned in the regulation of the movements and correlation of the intestines and viscera generally.

Intoning, a modern popular term for the utterance in musical recitative of the versicles, responses, collects, etc., of the Anglican liturgy. This recitative consists mainly of a single sustained note, or monotone, but may be varied by the introduction of certain simple inflections, which have the sanction of more or less prevalent custom or tradition. It would seem to be the outcome of an instinctive feeling that the familiarity of our colloquial tones of voice is out of keeping with the reverence that befits human intercourse with Deity.

Intoxication, the state produced by the excessive use of alcoholic liquids. In the first stage the circulation of the blood becomes somewhat more rapid, and all the functions of the body and mind are exercised with more freedom. In the second stage the effect on the brain is more decided. The peculiarities of character, the faults of temperament, manifest themselves without reserve; the secret thoughts are disclosed, and the sense of propriety is lost. In the next degree consciousness is still more weakened; the ideas lose their connection; vertigo, double vision, and other discomforts supervene; till finally the excitement partakes of the nature of delirium, and is followed by a more or less prolonged stupor, often by dangerous coma. In cases of extreme intoxication the stomach pump should be employed if ordinary emetics fail to overcome the torpor of the stomach. Among the best antidotes are preparations of ammonia and strong infusions of coffee and green tea. The body should be kept warm.

Intransigentes (-t r ä n′s ē-h e n-t ā z) (Spanish, "the irreconcilables"), the name given to the Extreme Left in the Spanish Cortes, and afterward to the extreme Republican party in Spain, corresponding with the Communists in France. In the latter sense it was first used in the Spanish troubles which arose when Amadeus resigned the throne in 1873.

Intrenchment, any work that fortifies a post against the attack of an enemy. The word is generally used to denote a ditch or trench with a parapet. See FORTIFICATION.

Intrepid, The, the name given to the Tripolitan ketch captured by Decatur, in which he and 74 brave American tars, on the night of Feb. 16, 1804, entered the harbor of Tripoli and boarded the American warship "Philadelphia," which the Tripolitan pirates had captured, and after a fierce struggle with her turbaned defenders killed or drove them into the sea.

Introduction, in music, a kind of preface or prelude to a following movement. Formerly the introduction was only to be found in large musical works, such as symphonies, overtures, oratorios, etc.; but now it is found in every rondo, fantasia, polonaise, waltz, etc., on the principle that it is considered abrupt to begin all at once, without preparing the audience for what is to come. In earlier operas introduction is applied to the piece of music with which they begin, and which immediately follows the overture. In some cases the overture and introduction are united, the composition going on without any formal pause. Overtures themselves are frequently commenced by an introduction, as in Beethoven's "Egmont and Leonora," Nos. 2 and 3, and Weber's "Freischütz" (Free-shooter) and "Oberon" overtures. The majority of Wagner's operas commence with an introduction (*Vorspiel* or *Einleitung*), a short one being also prefaced to the second and third acts. The introductions are also important and characteristic parts of several of the symphonies of Beethoven and Schumann.

In Biblical science, a department, the objects of which are stated by Prof. K. A. Credner, D. D., to be five-fold: (1) The origin of the individual books received into the sacred canon; (2) the history of the canon and the origin of the collection of Scripture books; (3) the history of the several translations, etc.; (4) the history of the text, and (5) the history of interpretation. It is divided into introduction to the

Old and introduction to the New Testament.

Introit, or **Introitus,** in the Roman Catholic Church, words recited by the priest in saying Mass, after the Confiteor, as soon as he has ascended the altar. The custom of reciting the Introit is of early origin, and has been attributed to Gregory the Great. The words are usually from some psalm, formerly recited entire, and have an antiphon, and are followed by a Gloria; in some cases they are taken from other portions of Scripture, and occasionally from uninspired writers. The old English word is office, which corresponds to the Latin *officium*, by which name the Introit is known in the Mozarabic, Carthusian, Dominican, and Carmelite missals. At High Mass and in a Missa Cantata the Introit is sung by the choir as the priest commences the Mass.

In the Anglican Church, a short anthem, psalm, or hymn, sung while the minister proceeds to the table to commence the Communion service. Formerly, in some English cathedrals, the Sanctus was sung as an Introit. This practice arose probably from the fact that the Communion service soon after the Reformation ceased to be performed chorally, a proof of which is found in the fact that for nearly two centuries — namely, from 1660 to 1840 — the Sanctus was never set to music except as an Introit, nor was the *Gloria in excelsis* set but as an anthem.

Intromission, in Scotch law, the act of intermeddling with the property or effects of others, whether legally or without authority; also the dealing of a factor or agent with the money of his employer.

Intrusion, in geology, the operation of forcing through or into sedimentary strata. Used of volcanic rocks (see INTRUSIVE ROCKS). In law, an unlawful entry into or on lands and tenements void of a possessor, by one who has no right to the same. In the Scotch Church, the settlement of a minister in a church or congregation against the will or without the consent of the congregation. The term was frequently used during the 10 years' ecclesiastical controversy which culminated in the disruption of the Scotch Church in 1843.

Intrusive Rocks, in geology, rocks of igneous origin which have forced their way through crevices or rents in sedimentary strata, or have broken them up. Intrusive sheets of eruptive rock may be distinguished from true lava flows which have been subsequently overlaid conformably by sedimentary strata, by the fact that the rocks, both above and below the intrusive sheets, are altered at the contacts, while in the case of lava-flows the rocks over which they ran have been altered, but the deposits above them show no trace of metamorphism.

Intuition, in ordinary language, the act of looking on; a sight, a view; a regard, an aim. In philosophy, a term borrowed from scholastic theology, where it signifies a knowledge of God supernaturally obtained, and by consequence, superior to knowledge obtained by ordinary methods. In passing into the service of philosophy the word intuition has retained in some measure the idea of superiority, or at least of priority. In the French and Scotch schools all beliefs and judgments presenting themselves spontaneously to the mind, with irresistible evidence, but without the assistance of reasoning or reflection, are called intuitions, axioms, first principles, principles of common sense, or self-evident truths, and the recognition of these intuitions is the fundamental doctrine of intuitionalism. In the school of Kant the word intuition is nearly synonymous with perception. As to Schelling's teaching:

> "In both [the Alexandrian and German Schools] the incapacity of Reason to solve the problems of Philosophy is openly proclaimed: in both some higher faculty is called in to solve them. Plotinus called this faculty Ecstasy. Schelling called it the Intellectual Intuition. The Ecstasy was not supposed to be a faculty possessed by all men and at all times; it was only possessed by the few, and by them but sometimes. The Intellectual Intuition was not supposed to be a faculty common to all men; on the contrary, it was held as the endowment only of a few of the privileged; it was the faculty for philosophizing."—G. H. Lewes, "History of Philosophy."

Intussusception, in ordinary language, the reception of one part within another. In anatomy, the term used when part of a tube is inverted within the contiguous part. (Owen.) The art, operation, or process of taking dead matter into a living being. (Nicholson.) In pathology, the accidental insertion or protrusion of an upper segment of the bowels into a lower. The varieties are ileo-cæcal, iliac, jejunal, and colic. It occurs most frequently in infancy and childhood, and in the adult death ensues in 5 or 6 days if the stricture is not removed. By drawing one portion of a toeless long stocking into the other, a correct representation of this condition is obtained. Inflation, practised long ago by Hippocrates, is the most successful treatment.

Inulin, or **Inuline,** in chemistry, $C_6H_{10}O_5$, a soft white tasteless powder, isomeric with and similar in its properties to starch. It is very widely distributed throughout the vegetable kingdom, being found in the roots of elecampane, dandelion, chicory, feverfew, in the tubers of the potato, the dahlia, and the Jerusalem artichoke, in the seeds of the sunflower, and in many other plants. It is usually prepared from the sliced or rasped roots of the elecampane or the dahlia, by boiling with water in the presence of sodium carbonate.

The liquid obtained is cooled by a freezing mixture, when the inulin precipitates. To obtain it pure, it is dissolved in hot water, filtered, and again exposed to a freezing mixture. On repeating this process three or four times, the inulin is obtained perfectly white. It is insoluble in alcohol, slightly soluble in cold water, but very soluble in boiling water. It dissolves in an ammoniacal solution of cupric oxide, the solution yielding, after a few hours, a blue amorphous precipitate, insoluble in water and in ammonia, but soluble in tartaric acid. Its specific gravity is 1.349, and its optical lævo-rotatory power $[a]_D = 34.6$. When heated with water in sealed tubes at 100°, or when boiled with dilute sulphuric acid, it is converted into a sugar which has all the properties of levulose. Inulin is distinguished from starch by its giving a yellow or yellowish-brown instead of a blue color with iodine; by its solubility in aqueous cuprammonia, and by its inalterability under the influence of ferments. It appears to be a substance intermediate between gums and starch. Inulin has lately been examined by H. Kiliani. He assigns to it the formula, $C_{36}H_{62}O_{31} = 6C_6H_{10}O_5 + H_2O$.

Inunction, the act of rubbing in an ointment or liniment. Inunction of the whole body with a piece of bacon, lard, or with olive oil has been recommended in scarlet fever, measles, and in scrofulous or tuberculous cachexia. Inunction of cod-liver oil is a very useful adjunct in the treatment of marasmus. A teaspoonful of warm cod-liver oil is used morning and night, rubbing in the groins and armpits in rotation; one groin in the morning, the other groin in the evening, one armpit the next morning, and so on.

Inundation. See FLOODS.

Invalides (a*ng*-väl-ēd′), the name of a French soldiers' home. Previous to the reign of Henry IV., old and disabled soldiers had no other resources in France than the charity of the monastic establishments of royal foundation to depend on for their support; but in 1596 that king formed an asylum for military invalids in an old convent in the Faubourg St. Marcel. This institution was removed to the Château de Bicêtre by Louis XIII., but for want of funds did not receive any augmentation. In 1670, during the administration of Louvois, Louis XIV., by whose wars the number of invalids was greatly augmented, determined to found a magnificent establishment to receive them. The foundations were laid in 1670, and the main building was finished about 1706. Several additions were made at various times to the buildings of the hotel; and the whole edifice now covers 16 acres of ground, enclosing 15 courts. The church or dome was built by Mansard, and finished in 1706. All soldiers who are actually disabled by their wounds, or who have served 30 years and obtained a pension, are entitled to the privileges of this institution.

Inventions and Discoveries. The following list purports to give only a few of the more important inventions and discoveries, chiefly such as have exercised an influence on the civilization of the world:

Mariner's compass, invented in Europe in the 12th century, though known and used for centuries previously in China.
Gunpowder, by Schwarz, about 1320 (see GUNPOWDER).
Printing, by Johann Gutenberg, about 1440 (see PRINTING).
Copernican system, in 1543, by COPERNICUS (*q. v.*).
Microscope, by Hans and Zacharias Janssen, or Zansz of Middelburg, about 1590.
Circulation of the blood, by Harvey, in 1616.
Electricity, name invented and knowledge of advanced by W. Gilbert, 1651; induced electricity discovered in 1831, and its relation to magnetism shown in 1819 by Oersted, and in 1838 by Faraday.
Law of gravitation, by Newton, 1682.
Steam engine, by Newcomen, in 1705, and by Watt, in 1768.
Pianoforte, by Cristofori of Florence, before 1720.
Clock, used in Europe in the 11th century.
Chronometer, by John Harrison, 1762.
Spinning jenny, by Hargreaves, in 1767.
Balloons used by Montgolfier, 1782-1783.
Weaving loom, by Cartwright, in 1785.
Gas lighting, by William Murdoch, in 1792, at Redruth, in Cornwall.
Vaccination, by Jenner, in 1796.
Lithography, by Senefelder, in 1800.
Steamboat, proved practically useful, by Fulton, in 1807.
Voltaic Arc, by Sir Humphry Davy, in 1809.
Locomotive on railroad, by George Stephenson, in 1814.
Miner's safety lamp, by Davy, in 1816.
Photography, by Niepce, in 1828.
Magneto-electricity, by Faraday, in 1831.
Electric telegraph, by Morse, 1835, and by Wheatstone and Cooke, 1834-1837.
Electrotyping, by Jacobi, in 1839.
Sewing machine, by Elias Howe, 1841.
Chloroform, used as an anæsthetic by Simpson in 1848.
Evolution theory, by Darwin and Wallace, in 1858.
Spectrum analysis, by Kirchhoff and Bunsen, 1860.
Telephone, by Bell, in 1876.
Incandescent vacuum lamp, by Edison, in 1879.
Phonograph, by Edison, in 1889.
Kinetograph, vitascope, etc., by Edison, in 1893.
X-Rays, by Roentgen, in 1895.
Wireless telegraphy, by Marconi, in 1897.
Polonium, by Prof. and Mme. Curie, in 1898.
Radium, by Prof. and Mme. Curie and Prof. Bemont, in 1899.

Inventory, a list or catalogue of goods and chattels, containing a full, true, and particular description of each, with its value, made on various occasions, as on the sale of goods, decease of a person, storage of goods for safety, etc.; hence, generally a list, an account, a catalogue.

Inverness, a sea-port town of Scotland; on both sides of the Ness river, at its entrance into the Moray Frith, 115 miles

from Edinburgh. It is a fine town, with a commodious harbor, and was long considered as the metropolis of the Highlands. Tartan cloth for the Highland markets is here manufactured in considerable quantities. Pop. (1901) 21,193.

Inversion, the chemical change which takes place when starch, dextrin, or sugar is boiled with a dilute acid. Different acids act with various degrees of rapidity; mineral more quickly than organic acids; sulphuric acid the most quickly of all. Thus starch and dextrin are changed into glucose, cane-sugar into invert sugar, maltose into glucose, etc. Inversion may also take place in the presence of ferments, or by prolonged boiling with water.

In geology, the overturning or folding over of strata by igneous agency, so that the order of their succession seems reversed.

In mathematics, the operation of changing the order of the terms, so that the antecedent shall take the place of the consequent and the reverse, in both couplets. Thus, from the proportion $a : b : : c : d$, we have, by inversion, $b : a : : d : c$.

In music, the transposition of certain phrases having a common root. (1) The inversion of a chord is effected by making one of the inner notes act as a bass note, and by this means as many inversions can be made as there are actual notes in the chord, not counting the root. In such inversions the harmony remains the same, though the order of component parts is changed. (2) Intervals are inverted by making that which was the upper note the lower, and the reverse. The inversion of an interval within the octave may readily be found in the difference between the figure 9 and the interval known; then an interval of a second becomes a seventh by inversion, etc. (3) The inversion of a subject is produced by inverting the intervals of which it consists.

Invertebrata, a collective term applied to indicate all the great lower divisions or sub-kingdoms of the animal series, and used in contradistinction to the highest group of the animal kingdom, to which the name *Vertebrata* or vertebrate animals is given. Lamarck was the first to map out this general and broad subdivision of the animal realm, but since his day many and important changes have taken place in the constitution of the subordinate group included in the invertebrate section of the animal world. Thus Cuvier mapped out the *Radiata*, *Articulata*, and *Mollusca* as the three great invertebrate sections, while the *Vertebrata* formed the fourth and concluding section of the series. Succeeding naturalists, from a fuller and more perfect consideration of the structure of the invertebrates, split up the Cuvierian *Radiata* into the sub-kingdoms *Protozoa*, *Cœlenterata*, and *Echinozoa*, and at the same time redistributed and rearranged many of the forms which the radiate division contained. Particularly was this process effected with regard to the lower animals, many of which were removed to a much higher place in the animal series, from a consideration of their structure and analogies. The primary divisions of the animal kingdom, or "sub-kingdoms," as they are technically called, which are now included in the invertebrate section of the animal world, may be tabulated as follows, commencing in order with the lowest division:

I. Protozoa (*protos*, first *zoön*, animal), represented by many microscopic animalcules (*Foraminifera*, *Infusoria*, etc.) and by sponges, etc.

II. Cœlenterata (*koilos*, hollow; *enteron*, the bowel), represented by Hydræ, Zoöphytes or Polypes, *Medusæ* or sea-blubbers, sea-anemones, coral polypes, etc.

III. Echninozoa or Annuloida (*echinos*, a spiny animal; *zoon*, animal; *annulus*, a ring; *eidos*, likeness), including star-fishes, sea-urchins, lily-stars, tape-worms, thread-worms, wheel-animalcules, etc.

IV. Annulosa (Latin, *annulus*, a ring), worms, insects, spiders, crabs, lobsters, etc.

V. Mollusca (Latin, *mollis*, soft), represented more especially by mussels, oysters, whelks, snails, cuttlefishes, etc.

The characters by which the invertebrates are distinguished from the *Vertebrata* are chiefly negative features as applied to vertebrate structure. By briefly enumerating these positive and vertebrate features we may therefore gain an idea of the negative characters of the lower section of the animal series. Thus, firstly, the *Vertebrata* all possess an internal skeleton, of which the spine or backbone is the chief element, and which serves to support the soft parts, and for the attachment of muscles. Where the vertebrate skeleton is rudimentary (as in the case of some lower fishes — for example, the lancelet — *Amphioxus*), we at any rate find the spine to be represented by a cellular or fibrous rod-like structure, lying in the back or spinal region, and is known as the notochord or the chorda dorsalis.

This notochord is merely the spine in an immature state of development, and is present in the early life of every vertebrate. Therefore the presence, either of an internal skeleton or of a notochord, is the first grand characteristic of vertebrate animals. Indeed the name *Vertebrata* is derived from the term *vertebra*, applied to each of the joints of which the spine is composed. And the term *vertebra* is derived from the Latin verb *vertere*, to turn, applied to this present point in reference to the degree of mobility usually permissible

between the various joints of the spine. In invertebrates no structure analogous or corresponding in any sense to the vertebrate spine is found. Where hard parts exist in the *Invertebrata* they are generally placed on the outside of the body, and thus constitute an exo-skeleton, or outer skeleton — a term used in contradistinction to the true endo-skeleton, or internal skeleton of the *Vertebrata*. The shell of the crab or lobster, or the horny covering of beetles and other insects, familiarly exemplify the condition of the skeleton in invertebrates. In vertebrates the chief centers of the nervous system, consisting of the brain and spinal marrow, are inclosed in the spine, which thus forms a tube separating the nervous centers from the other organs and systems of the body.

In invertebrates no such specialization or setting apart of the nervous system occurs, these centers being contained in the same cavity as the other systems, and in no wise separated from the other viscera. The limbs of vertebrates are never more than four in number, while those of the *Invertebrata* may be very numerous, and may exist in pairs (as in vertebrates), or be single and median organs. The vertebrate limbs are further supported by an internal skeleton, forming an appendage of the internal skeleton of the body, and are turned away from that side of the body on which the nervous system is situated. In invertebrates the limbs are not so supported, the hard parts of the limbs, if present, being external to the limb. The jaws of vertebrates are always parts of the head adapted for mastication. In invertebrates the jaws may be formed by modified limbs, or by hard structures developed in the lining membrane of the mouth, or of the digestive system. The relative positions of the various systems of the vertebrate body present characteristic differences from the arrangement and situation of the systems of the invertebrate. Thus in the vertebrate the chief masses of the nervous system are situated in the dorsal or back region; the digestive system occupies the middle of the body; and the heart lies ventrally, or on the lower surface of the animal. The position of the systems varies in invertebrates, but in none is this definite special arrangement of parts to be discerned. In all vertebrates, except the little fish known as the lancelet, a distinct heart is found; but a heart is frequently wanting in the invertebrate groups. Then further, no invertebrate possesses a system of absorbent vessels, or lacteals, by which the digestive products are taken up from the alimentary system and poured into the current of the circulation. The lacteal or absorbent system of vessels is therefore distinctive of *Vertebrata*. And in vertebrates a large portion of the blood which is sent to the digestive organs, instead of being returned to the heart and breathing organs for purification, is carried to the liver by the portal vein, and from this blood the bile is elaborated. No similar arrangement is found in invertebrates. And lastly, in regard to their reproduction, vertebrates are to be distinguished from *Invertebrata* by the fact that the reproduction of the former group is purely and solely sexual; that is, the elements furnished by the two sexes are alone competent to produce new individuals. And in all vertebrates the sexes are situated in different individuals. In *Invertebrata*, on the contrary, while true sexual reproduction is represented in many instances, asexual modes of the process are frequently observed. Thus, many invertebrates reproduce their species by gemmation or budding, and by fission or division of the body-substance, whereby two or more new forms are produced by the division of the parent organism. And as a result, while many of the *Invertebrata* form compound colonies or compound organisms, all vertebrates exist as simple and single individuals. The sexes in invertebrates may further exist in one and the same animal, when the organism is then said to be monœcious or hermaphrodite.

Investiture. From the establishment of the Church under Constantine the Great, the Roman functionaries increasingly interfered in ecclesiastical affairs. The emperors, kings, and princes of Europe became accustomed to confer the temporalities of the larger benefices and monasteries by the delivery of a ring and a staff, or crozier. When the bishop or abbot elect had received these, he carried them to the metropolitan, who returned them, to indicate that the Church had conferred on him sacred office. Pope Gregory VII. (Hildebrand) considered that a ring and a crozier were insignia of spiritual office, and not of its temporal accompaniments. He therefore wished the then reigning emperor, Henry IV., to cease conferring investitures, and threatened to excommunicate any one conferring such investitures or receiving them. A fierce contest now arose between them, continued by their successors. By an arrangement at the Diet of Worms, 1122, it was settled that the emperor should confer the temporalities of a see or abbacy by other symbols.

Invincibles, an Irish secret society, not identical with, though it developed from, that of the Fenians, in or prior to 1882. One of the main objects of the Invincibles was to "remove" (a euphuism for "to assassinate") government officers or others who might incur the displeasures of the association or its leaders. On May 6, 1882, it achieved what doubtless it deemed a great victory, having on that day succeeded in "removing," *i. e.*, in stabbing to death, Lord Frederick Cavendish, who had just ar-

rived from England as Secretary for Ireland, and Thomas A. Burke, the Under-Secretary, in the Phœnix Park at Dublin. The plot was directed against the latter gentleman, and the former, nobly interfering to protect his friend, shared his fate. The nefarious deed arrayed against the unknown murderers the moral feeling of the civilized world, and the government soon overcame the "Invincibles." On Feb. 20, 1883, 20 charged with complicity in the Phœnix Park murders were put on trial; on July 14, Joseph Brady, who had been convicted of actual perpetration of the murder of Mr. Burke, was executed, as were others subsequently. The leading witness, who revealed all the secrets of his fellow conspirators, was one James Carey, a member of the Common Council of Dublin. He was shot dead in a steamboat near Natal, on July 29, by an Irishman, O'Donnell, who was subsequently brought to England, tried, and executed for his crime in December, 1883.

Invocation, a judicial call, demand, or order; as, the invocation of papers into court.

Invocation of Saints. The authoritative statement of Roman doctrine on this subject is found in a decree of the Council of Trent (sess. 25, held Dec. 3 and 4, 1563), which ordains that "all bishops and others having the duty of teaching" should instruct the faithful:

> "That the saints reigning with Christ offer their prayers to God for men; that it is good and useful to invoke them, and to have recourse to their prayers, succor, and assistance to obtain benefits from God through His Son Jesus Christ, our Lord, who alone is our Redeemer and Saviour."

Here two propositions are laid down in the plainest possible manner: (1) That the saints do intercede for men; (2) the utility of asking such intercession. Theologians allege Scripture and tradition in support of the doctrine and practice (see Jer. xv: i; Luke xv: 7; Rev. v: 8, vi: 9–11, viii: 3). The chief argument is from analogy; the oneness of the mystic Body of Christ (I Cor. xii: 12); the duty of mutual prayer, and the efficacy of the prayers of the just on earth (James v: 15–18); and the value which St. Paul set on the prayers of his fellow-Christians (Eph. vi: 18, 19; Col. iv: 3, 4; II Thess. iii: 1). But on the other hand see I Tim. ii: 5. It should be noted that the saints are asked to intercede for men, and not to bestow of their own power either temporal or spiritual blessings. Inscriptions in the Catacombs show that the practice was common in the Early Church, and mention of it is made by St. Gregory Nazianzen, St. Basil, St. Gregory Nyssen, St. Ambrose, and St. Augustine. The devotion of the Church is chiefly toward the saints who died after Christ. To the Maccabees alone is a feast celebrated in the whole Latin Church. (The texts are from the Authorized Version; the Fathers from Migne.)

Anglican Theology.— There were very many reasons why, when the "Articles of Religion" were "ratified and confirmed," the separation between the Reformed and Roman Churches should be made as marked as possible, and the 22d of the Thirty-nine Articles strongly condemns the invocation of saints. The liturgy is less unfavorable to the doctrine. In the canticle *Benedicite, omnia opera,* from the apocryphal portion of Daniel, the "Angels of the Lord" (Dan. iii: 58 in the Vulg.) and "the Spirits and Souls of the Righteous" (iii: 86) are called upon to "bless the Lord," to "praise Him and magnify Him for ever." Here there seems to be an admission that angels and the departed just hear the invocations of, though there is no declaration as to their intercession for, members of the Church militant. The practice, as a private devotion, was known in Caroline days, and lingers, in a debased form, in country districts, in the rhyme:

> "Matthew, Mark, Luke, and John,
> Guard the bed that I lie on," etc.

With the Oxford Movement the doctrine of the Invocation of Saints came to the front.

Invoice, a statement on paper concerning goods sent to a customer for sale or on approval. It usually contains the price of the goods sent, the quantity, and the charges on them made to the consignee. Any other details respecting which it is important for the consignee to be informed are added, and in these respects it differs from a trade bill or definite account.

Involucre, or **Involucrum,** in botany, verticillate bracts surrounding the flowers of *Umbelliferæ* and *Compositæ.* Those surrounding the general umbel in the former order are called the universal involucre, and those around the umbellules the partial involucre. An involucre may be calculated, scaly, imbricated, superimposed, etc. Linnæus calls the involucre the common calyx.

Involute, a term of special signification in geometry. If a thread be tightly wrapped about a given curve, and then unwrapped, being kept stretched, each point of it will generate a curve, called an "involute" of the given curve. The given curve, with respect to any of its involutes, is called an evolute. Any given curve has an infinite number of involutes, and in order to fix the position of any one of them, it is necessary to know not only the evolute, but also one point of the involute.

Involution, in mathematics, the operation of finding any power of a given quantity, the multiplication of a number into itself any given number of times; thus the third power of 2 is found by involution, or multiplication of the number by itself, and the product by the same number; thus $2 \times 2 \times 2 = 8$. It is the reverse of EVOLUTION (*q. v.*). The operation of involution may be directly performed by continued multiplication, but it is often performed by means of formulas, particularly by the binomial formula.

In grammar, the insertion of one or more clauses or members of a sentence between the agent or subject and the verb.

In pathology, the restoration to its normal size of any part which has been abnormally developed. The opposite of evolution.

Io (ī′ō), in Greek mythology, according to one of the most popular versions, a daughter of Inachus, King of Argos. The love of Zeus for this maiden roused, as in other myths, the jealousy of Hera, who transformed Io into a heifer, and placed her in charge of Argus Panoptes. This guardian was slain by Hermes, who was thence called Argeiphontes, or the Slayer of Argus. Hera then sent a gadfly, which stung the heifer, and drove her in madness over the earth. Thus began those wanderings of Io which Æschylus has sketched in his drama of "Prometheus Chained."

Io, in astronomy, (1) the first satellite of Jupiter, discovered by Galileo in 1610. The names of the four satellites of this planet are seldom used, especially as three of them have been assigned to asteroids as well, and they are generally known by the numbers I, II, III, and IV. (2) The name of the 85th asteroid, discovered by Peters at Clinton, N. Y., Sept. 19, 1865, the fourth of the small planets detected by him.

Iodine, in chemistry, a haloid monatomic element; symbol I; at. w. 127. Obtained from the ash of sea-weeds called kelp; this is treated with water, filtered and evaporated to a small bulk; potassium and sodium salts crystallize out and the dark-brown mother liquid is then mixed with sulphuric acid and manganese dioxide, and, gently heated in a still, the iodine distills over and is collected in a receiver.

$2HI + MnO_2 + H_2SO_4 = MnSO_4 + 2H_2O + I_2$ The iodine of commerce is generally impure; it may be purified by dissolving it in a solution of potassium iodide till it is saturated, adding water which precipitates pure iodine. Iodine crystallizes in dark gray rhombic crystals, having a metallic luster resembling graphite; sp. gr. 4.95. It melts at 107° and boils at 175°. Its vapor is of a deep blue color; when less dense it has a violet color. Iodine dissolves in 7,000 parts of water; it is soluble in alcohol, ether, chloroform, and in carbon disulphide. Iodine stains the skin brown, and is soluble in potassium iodide. At ordinary temperatures iodine is slightly volatile, and has a peculiar smell. A small trace of iodine can be detected by its giving a blue color to starch. The blue color is destroyed by heat, but reappears on cooling. Iodine unites with other elements and radicals, forming iodides. Its affinity for oxygen is greater than that of chlorine, but it has a less affinity for hydrogen, hence hydriodic acid is easily decomposed by chlorine.

In pharmacy, iodine is used externally in chronic skin diseases and over enlarged and indurated parts and diseased joints to alter action or cause absorption, or to kill parasites. It may be applied in the form of a liniment, a solution, a tincture, or an ointment. As a vesicant the liniment may be painted over the part once, or, if need be, twice or three times. The *vapor iodi* (vapor of iodine) may be used as an inhalation in some forms of chronic bronchitis and phthisis. A solution of iodine is useful for rendering very transparent objects more distinct.

Iodism, the term within which is included a variety of painful and inconvenient results following, under rare circumstances, the administration of iodine and its salts, but more especially the iodide of potash; mental depression; irritation of mucous membranes, as sneezing, watering at the eyes, etc.; a papular and pustular eruption of the skin; nausea, loss of appetite, and a bitter taste in the mouth.

Iodoform, in chemistry, CHI_3, a lemon-yellow crystalline substance, having a saffron-like odor and an unpleasant iodine-like taste. Its odor is most persistent, and can hardly be removed. It is of interest as having a composition similar to that of CHLOROFORM (*q. v.*), from which it only differs in having iodine in the place of chlorine. It may be prepared by the action of iodine on alcohol in the presence of carbonate of potash. It is almost insoluble in water, but dissolves in alcohol, ether, and chloroform. It is readily volatile when heated, and in the form of vapor has anæsthetic properties. It is employed externally as an application to painful ulcers, and it often gives relief in uterine cancer. In the form of iodoform gauze it is used in antiseptic surgery.

Iolaus (ī-ō-lā′us), in Greek mythology, a companion of Hercules. He was worshiped chiefly in Sardinia.

Iolite. See CORDIERITE.

Ion (ī′on), a son of Xuthus, son of Erechtheus. He married Helice, daughter of Selinus, King of Ægiale. He succeeded

to his father-in-law's throne, and built a city, which he called Helice, after his wife. His subjects were named after him, Ionians, and their country that of Ionia.

Iona (ī-ō′nä), or **Icolmkill** (ī-kōm-kil′), the isle of Columba's cell or retreat, one of the W. islands of Scotland, in the Atlantic Ocean, separated from the W. point of Mull by a narrow channel called the Sound of Iona, 7 miles from Staffa; 3 miles long; 1½ miles broad; area, 2,000 acres. It is chiefly interesting to the antiquarian, for the ruins of its ancient religious edifices. These were established about the year 565, by St. Columba, who left Ireland, his native country, with the intention of preaching Christianity to the Picts. In the church, said to have been built by Queen Margaret toward the latter end of the 11th century, are the tombs of 48 Scottish kings, 4 kings of Ireland, 8 Norwegian monarchs, and 1 king of France. The rearing of black cattle forms the principal occupation of the inhabitants.

Ionia, in ancient geography, the most flourishing district of Asia Minor, where a colony from Attica settled about 1050 B. C. This beautiful country extended from the Hermus along the shore of the Ægean Sea to Miletus and the promontory of Posideum. It was bounded on the N. by Æolia, S. by Caria, E. by Lydia and part of Caria, and on the W. by the Icarian and Ægean seas, and lay between lat. 37° and 40° N.; its longitude has never been accurately defined. This country is said to have been peopled by Greek colonists about 1045 B. C. After founding Colophon, Ephesus, Miletus, and other important cities, the Ionians obtained possession of Smyrna about 688 B. C., and the country soon attained a high degree of prosperity. At the commencement of the reign of Crœsus, 560 B. C., it was subject to the Lydians, and it was conquered by Cyrus 557 B. C. The inhabitants made unsuccessful efforts to regain their independence, 500 and 406 B. C., and they assisted the Greeks against the Persians at the battle of Mycale, 479 B. C. The Persian yoke was at length shaken off by the victory at the Eurymedon, but the peace of Antalcidas again imposed it on the Ionians 387 B. C. On the overthrow of the Persian empire by Alexander III., Ionia became subject to Macedonia, and it afterward formed part of the Roman empire 133 B. C.

Ionia, a city and county-seat of Ionia co., Mich.; on the Grand river, and the Detroit, Grand Rapids and Western and the Grand Trunk railroads; 35 miles E. of Grand Rapids. It contains the State House of Correction, the State Asylum for the Dangerous and Criminal Insane, large railroad repair shops, and manufactories of pottery, furniture, machinery, edged tools, and clothing. The industrial interests are greatly promoted by excellent power furnished by the river. The city has a public high school, library, several daily and weekly periodicals, and an assessed property valuation of about $2,500,000. Pop. (1900) 5,209; (1910) 5,030.

Ionian Islands, the name commonly given to the seven islands, Cephalonia, Cerigo, Corfu, Ithaca, Paxo, Santa Maura, and Zante, with a number of islets, extending along the S. W. coast of Greece; area 1,097 square miles; pop. 251,712. Corfu is the most N., and lies opposite to Albania; Paxo, Santa Maura, Ithaca, Cephalonia, and Zante, follow each other in succession to the S., lying along the coasts of Albania and the ancient Elis; but Cerigo is detached, being 150 miles to the S. E. of Zante, and opposite to the coast of the ancient Laconia. Products, corn, grapes, olives, currants, cotton, honey, wax, etc. Manufactures salt, olive oil, wine, brandy. The Ionian Islands, with their dependencies, were erected into the republic of the Seven United Islands, March 21, 1800. It was to pay a moderate tribute to the Porte, and its independence was guaranteed by Turkey and Russia. The French captured the islands in 1807, and Russia ceded them to France by a secret article of the treaty of Tilsit, July 7, 1807. The French garrisons surrendered to an English force, Oct. 3, 1809, and by a treaty between Great Britain and Russia, signed at Paris Nov. 5, 1815, they were formed into an independent State, called the United States of the Ionian Islands, or the Septinsular Republic, under the protection of England. With the consent of Great Britain, they were reunited to the kingdom of Greece in 1864.

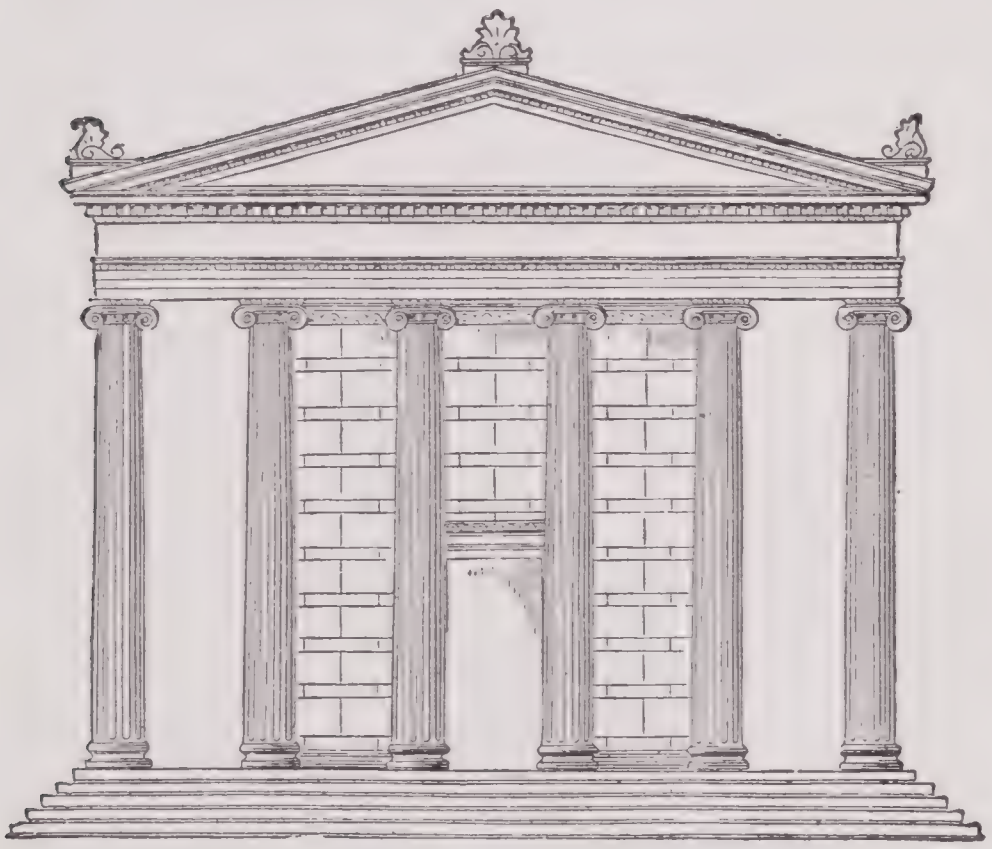
Ionian Mode, in music, one of the ecclesiastical modes, commencing on the note C, corresponding exactly in tonality with the major diatonic scale as used in modern music. See Mode.

Ionian Sea, that part of the Mediterranean communicating with the Gulf of Venice by the Strait of Otranto, and having Greece and part of European Turkey on the E.; Sicily and the most S. part of Italy on the W. Its greatest breadth is between Cape Matapan in the Morea, and Cape Passaro in Sicily, which is about 400 miles.

Ionian School, the first school of Greek philosophy, the distinctive characteristic of which was its inquiry into the constitution of the universe. Thales of Miletus opened the inquiry. The common notion that he taught "the principle of all things was water," must be taken with a distinction. Water, as the principle of Thales, was not water in any determinate form, but water instinct with vital energy, capable of taking an infinite number of forms. This doc-

trine appears in Hesiod, and the "*ariston men hudor*" of Pindar is proverbial. Thales is usually spoken of as the founder of the Ionian school; he was more — he was the father of Greek speculation. He prescribed no method, and those who followed him did not accept his answer to the question, What is the beginning of all things? But the special claim of Thales to notice lies in the fact that he was the first to ask the question, and the first to attempt to establish a physical beginning.

Ionic Order, one of the five orders of architecture, the distinguishing characteristic of which is the volute of the capital. Its main features are the same as in the Doric style; their forms, however, are different. The Ionic order has more moldings, its forms are richer and more elegant, and, as a style, it is lighter and more graceful than the Doric. The Ionic column has a less diminished shaft and a smaller parabolic curve than the Doric. It is channeled; the flutings, which are 24 in number, are separated by annulets, and are therefore narrower, but at the same time deeper, than the Doric, and are terminated at the top and bottom by a final curvature. The column has a base, which, as essential parts, has a molded or plain cavetto with a torus above, or the torus is placed above two cavetti, which are themselves separated by several intervening moldings. The so-called Attic base is the form which most frequently occurs, and consists of two tori separated by a cavetto, the whole having a plinth as basis. In the capital the Doric echinus is replaced either by a cyma ornamented with leaves, or, more generally, by an ovolo with a pearl beading beneath. Instead of the Doric abacus there occurs a cushion-like band in its place, whose ends, wound in a spiral shape and coiled with elastic force, when viewed either from in front or behind, form volutes which on both sides considerably exceed the diameter of the column, and also surpass the architrave in breadth. These volutes, or scrolls, when viewed from the side, appear to meet in the middle and form a wavy line over the achinus. The architrave consists of several fasciæ, which project slightly one over the other, and which are separated by small hollowed moldings and capped by a molded band. The frieze is undivided, either plain or with arabesques representing either implements used in worship or simple plants. The frieze also bears the name of the zophorus. As regards the proportions of the Ionic order, no such remarkable difference as in the Doric is perceptible in the monuments which have been preserved to us. The height of the column is from 8½ to 9 times the lower diameter; the distance between the columns averages about twice the diameter, while the height of the entablature is not quite one-fourth that of the column. The most perfect specimens of the Ionic order are the temples of Minerva Polias and of Erectheus in the Acropolis at Athens, and of Fortuna Virilis and the Coliseum at Rome.



IONIC TEMPLE.

Ion of Chios (kī′os), a Greek poet; born in Chios, about 484 B. C. Few losses to literature are so serious as the destruction of his works, fragments only of which have descended to us. He was a friend of Æschylus, Sophocles, etc., and produced tragedies, hymns, elegies, epigrams, and essays. Brilliant passages in his memoirs, saved to us by a happy accident, tell of the banquet he gave to Sophocles and the things said and done on that typically Hellenic occasion. He died in Athens about 422.

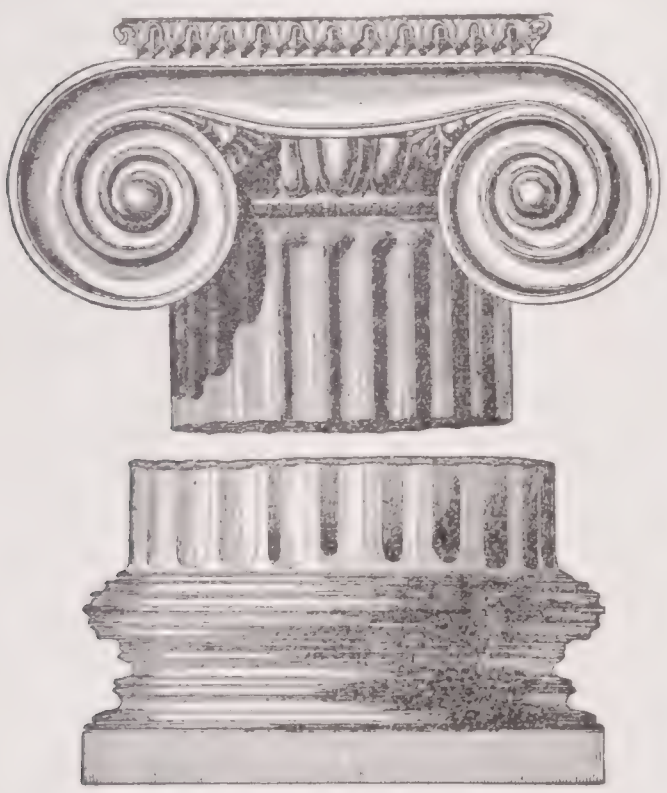
Iophon (ī′ō-fon), a son of the great dramatist Sophocles, also a tragic poet. He is said to have gained the second prize in a contest with Euripides and Ion in 428 B. C. Of his plays, 50 in number, only a few lines are extant.

Ions, the components into which an electrolyte is broken up on electrolysis. The one, the anion (the electro-negative compo-

nent — *e. g.*, chlorine), travels "against" the current (in its conventional direction in the circuit), and is deposited on or chemically attacks the anode or positive electrode; the other, the cation (the electropositive component — *e. g.*, copper), travels "with" the current to the cathode — *e. g.*, to the spoons in the plating bath. See ELECTRICITY.

Ios (ī'os), an island in the Ægean Sea, one of the traditional birth-places of Homer. His mother was born here, according to the ancients, and the poet's grave was likewise assigned to the island.

I O U, an English recognized contraction for "I owe you." A paper with these letters on it, followed by an amount and duly signed. It is a simple acknowledgment of indebtedness to some particular person. It is not a negotiable instrument, but, as it is an acknowledgment of a debt, that debt



IONIC COLUMN:
BASE AND CAPITAL.

can be sued for at any time, and it is so far equal to a promissory note payable on demand. This form of due bill has never obtained currency in the United States.

Iowa, a State in the North Central Division of the North American Union; bounded by Wisconsin, Illinois, Missouri, Nebraska, South Dakota, and Minnesota; admitted to the Union, Dec. 28, 1846; number of counties, 99; capital, Des Moines; area, 56,025 square miles; pop. (1900) 2,231,853; (1910) 2,224,771.

Topography.— The surface of the State is generally level, with a gentle rise toward the N. The highest elevation is near Spirit Lake, in Dickinson county, 1,694 feet. The center of the State forms a watershed between the Mississippi and the Missouri. There are no hills of consequence, the entire surface being a plateau, and whenever irregularities occur, they are depressions below the general level. There are steep bluffs along the river banks, caused by the wearing away of the drift and rocks, by the water. The State is covered with prairie land, with no swamps or natural forests. The water system is divided into two parts, those rivers flowing into the Mississippi in the E., and those flowing into the Missouri in the W. Among the former are the Upper Iowa, Turkey, Maquoketa, Wapsipinicon, Cedar, Iowa, Skunk, Des Moines, and Boone, while the Missouri system includes the Chariton, Grand Platte, Nodaway, Hishnabotona, Boyer, Maple, Little Sioux, Rock, and Floyd rivers. The Big Sioux river forms most of the W. boundary. There are many small and beautiful lakes, the largest being Spirit Lake, and the Okoboji Lakes, in Dickinson county.

Geology.— The State presents 20 distinct geological formations. The N. part belongs to the drift deposits of Minnesota. Lower down the Lower Silurian is prominent, with Potsdam sandstone, lower magnesium limestone, and St. Peter's sandstone. The Upper Silurian is represented by the Niagara and Le Clair limestone, and the Devonian by the Hamilton and Chemung carboniferous limestones.

Mineralogy.— The Illinois coal field extends over an area of 20,000 square miles in this State, and lead is found in Galena limestone, near Dubuque. The principal mineral productions of Iowa in 1899 were coal 4,618,842 short tons, valued at $5,260,716; limestone, valued at $785,576; sandstone, valued at $24,348; and mineral waters, 124,000 gallons, valued at $12,400. Other important mineral productions included gypsum, clay, pyrite, iron, and building sand.

Soil.— The soil generally is a soft black loam, formed directly through deposits of the Quaternary age, and varies from 1 to 100 feet in depth. The soil is easily worked, free from stones and stumps, and of almost inexhaustible fertility. The soil of the prairies is a diluvial drift, while the river beds furnish a light alluvial deposit. The principal natural trees are several varieties of oak, hickory, elm, black walnut, linden, cottonwood, maple, cedar, slippery elm, butternut, sycamore, ash, pine, and box-elder.

Agriculture.— The fertility of the soil and the ease with which it may be worked present special advantages for agricultural pursuits. Among native fruits are the plum, crabapple, grape, cherry, blackberry, gooseberry, strawberry, and raspberry, while the wild prairie grass is used for pasturage and for hay. The principal farm crops in 1900 were corn, 305,859,948 bushels, valued

96° 30′ A. 96° B 95° 30′ C 95° D 94° 30 E 94° F 93° 30′
MINNESOTA
IOWA
LYON
OSCEOLA
DICKINSON
EMMET
KOSSUTH
WINNEBAGO
WORTH
MITCHELL
HANCOCK
SIOUX
O'BRIEN
CLAY
PALO ALTO
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
CERRO GORDO
SIOUX CITY
WOODBURY
IDA
SAC
CALHOUN
WEBSTER
HAMILTON
HARDIN
MARSHALL
TAMA
BENTON
BUCHANAN
BLACK HAWK
BREMER
FAYETTE
CLAYTON
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHIEK
IOWA
MARSHALL
MILLS
POTTAWATTAMIE
COUNCIL BLUFFS
Omaha
CASS
ADAIR
MADISON
WARREN
MARION
MONTGOMERY
ADAMS
Creston
CLARKE
Osceola
PAGE
FREMONT
Shenandoah
TAYLOR
RINGGOLD
DECATUR
UNION
LUCAS
MONROE
MARION
Pella
Knoxville
Chariton
Corydon
Albia
Centerville
Mt. Ayr
Ringgold
Grant City
Princeton
Gainsville
Sioux City
Le Mars
Cherokee
Storm Lake
Fort Dodge
Webster City
Eagle Grove
Clear Lake
Mason City
Charles City
Nashua
Decorah
Waukon
Postville
Elkader
Manchester
Independence
Waterloo
Cedar Falls
Hampton
Iowa Falls
Marshalltown
Grinnell
Newton
Des Moines
Indianola
Winterset
Creston
Osceola
Corning
Clarinda
Shenandoah
Red Oak
Atlantic
Council Bluffs
Omaha
Glenwood
Sidney
Missouri Valley
Denison
Carroll
Manning
Audubon
Guthrie Center
Dallas Center
Perry
Boone
Ames
Nevada
Colfax
Monroe
Pella
Oskaloosa
Ottumwa
Centerville
Albia
Chariton
Mt. Ayr
Bedford
Clarinda
Shambaugh
Hamburg
Northboro
Blanchard
Braddyville
State Line
Watterson
Athelstan
Lee
Ringgold
Grant City
Princeton
Gainsville
Missouri River
Big Sioux River
Little Sioux River
Floyd River
Rock River
Des Moines River
Boone River
Iowa River
Cedar River
Wapsipinicon River
Turkey River
Maquoketa River
Upper Iowa River
Yellow River
Raccoon River
North Raccoon River
South Raccoon River
Middle River
Nishnabotna River
East Nishnabotna River
West Nishnabotna River
Nodaway River
Platte River
Nebraska City
Dunbar
Talmage
Plattsmouth
Weeping Water
Louisville
Ashland
Papillion
Irvington
Valley
Fremont
Arlington
Blair
Tekamah
Onawa
Soldier
Moorhead
Blencoe
Preparation
Dow City
Buckgrove
Manilla
Aspinwall
Dunlap
Baird
Mt. Pegah
Little Sioux
Orson
Allen
Willey
Woodbine
Whitesboro
Westphalia
Panama
Harlan
Jacksonville
Portsmouth
Persia
Tennant
Corley
Prairie Rose
Elk Horn
Brayton
Exira
Jolley
Dedham
Manning
Coon Rapids
Botna
Defiance
Irwin
Earling
Kirkman
Halbur
Roselle
Willey
Templeton
Carrollton
Winkelmans
Scranton
Grand Jc.
Jefferson
Ogden
Beaver
Grand Jc.
Farlin
Glidden
Ralston
Maple River
Mt. Carmel
Lidderdale
Benan
Lanesburg
Churdan
Adaza
Pilot Mound
Boxholm
Fraser
Dana
Zenorsville
Jordan
Grayson
Ontario
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Fraser
Dana
Zenorsville
Jordan
Grayson
Ontario
Ames
Hammond's 8 x 11 Map of Iowa
Copyright, 1908, by C. S. Hammond & Co., N.Y.
A 96° B 95° 30′ C 95° D 94° 30′ Long. E 94° West F 93° 30

IOWA
SCALE OF MILES
0 5 10 20 30 40
State Capital
County Seats
Size of type indicates relative importance of places
93° H 92° 30′ J 92° K 91° 30′ L 91° M 90° 30′ N
93° Green-wich 92° 30′ J 92° K 91° 30′ L 91° M 90° 30′ N
1
2
3
4
5
6
7
8
43° 30′
43°
42° 30′
41° 30′
41°
40° 30′
MINNESOTA
WISCONSIN
ILLINOIS
MISSOURI
MITCHELL
HOWARD
WINNESHIEK
ALLAMAKEE
FLOYD
CHICKASAW
FAYETTE
CLAYTON
BUTLER
BREMER
BUCHANAN
DELAWARE
DUBUQUE
GRUNDY
BLACKHAWK
TAMA
BENTON
LINN
JONES
JACKSON
MARSHALL
CLINTON
CEDAR
JASPER
POWESHIEK
IOWA
JOHNSON
MUSCATINE
SCOTT
MAHASKA
KEOKUK
WASHINGTON
LOUISA
MONROE
WAPELLO
JEFFERSON
HENRY
DES MOINES
APPANOOSE
DAVIS
VAN BUREN
LEE
Decorah
Cresco
Osage
Waverly
Oelwein
Waterloo
Cedar Falls
Independence
Iowa Falls
Marshalltown
Vinton
CEDAR RAPIDS
Dubuque
Maquoketa
Clinton
Tipton
Iowa City
DAVENPORT
Muscatine
Grinnell
Newton
Oskaloosa
Washington
Ottumwa
Fairfield
Mt. Pleasant
Burlington
Ft. Madison
Keokuk
Albia
Centerville
Pella
Mississippi R.
Des Moines R.

the Burlington, Cedar Rapids and Northern, and the Chicago, Rock Island, and Pacific railroads; 54 miles W. of Davenport. It is the seat of the State University of Iowa, the Iowa State Academy, the State Historical Society and Library, the Homeopathic, Allopathic, and Mercy Hospitals; is the farming trade center for Johnson, Cedar, and Iowa counties, with an annual trade exceeding $1,000,000; has excellent power provided by the Iowa river; and has manufactories of flour, iron, woolen goods, perfumery, gloves, jewelry, fencing, and linseed oil. One of the buildings of the State University, a handsome structure in the Doric style of architecture, was formerly used as the State capitol. The city has electric light and street railroad plants, waterworks on the Holly system, numerous churches, and an assessed property valuation of about $6,500,000. Besides its manufacturing interests the city has an extensive stock-raising and meat-packing industry. Pop. (1900) 7,987; (1910) 10,091.

Iowa, The, till the building of the "Illinois," the largest vessel in the United States navy. Four years were occupied in its construction, and the cost was over $3,000,000. It is a first-class twin-screw, steel battleship; 11,296 tons displacement; length 360 feet; breadth 72 feet 2½ inches; mean draft 24 feet; horse power 12,105; armor 14 inches on the sides, from 5½–15 inches on the turrets, and from 6–15 inches on the barbettes; main battery four 12-inch, eight 8-inch, and six 4-inch rapid-fire guns; secondary battery, twenty 6-pounder and four 1-pounder rapid-fire guns, and four Gatlings; speed, 17.087 knots; crew, 36 officers and 469 men. In the American-Spanish War the "Iowa" played an important part. At the bombardment of San Juan de Porto Rico it was Admiral Sampson's flagship, and was struck eight times without any impression being made on its armor. It also took part in the destruction of the Spanish fleet off Santiago.

Iowa College (former name of GRINNELL COLLEGE), in Grinnell, Ia.; founded in 1847 by the Congregational Church, now co-educational and non-sectarian; has endowment of over $1,300,000; grounds and buildings valued at $600,000; volumes in the library, 41,000; average number of faculty, 50; average students, 600.

Iowa State College of Agriculture and Mechanic Arts, a co-educational, non-sectarian institution in Ames, Ia.; chartered in 1858; opened in 1868; has productive funds exceeding $700,000; grounds and buildings valued at over $1,700,000; scientific apparatus, etc., $300,000; volumes in the library, 27,000; faculty, 150; students, about 2,650.

Iowa Wesleyan University, a co-educational institution in Mount Pleasant, Ia.; founded in 1844 under the auspices of the Methodist Episcopal Church; has endowment funds aggregating $61,000; grounds and buildings valued at over $160,000; volumes in the library, about 11,000; average ordinary income, $25,000; average number of faculty, 28; average student attendance, 650; number of graduates since opening, over 800.

Ipecacuanha (ip‴-e-kak″-ū-än′ä), or **Ipecacuan** (-kak′ū-an) (the native Brazilian name), in botany, the plants producing the drug so named. In pharmacy: (1) The dried root of *Cephaelis ipecacuanha,* a conchonaceous plant from Brazil. The ipecacuanha from that country is called annulated, to distinguish it from the striated kind from Peru. It arrives from Rio Janeiro and elsewhere in contorted pieces two to four inches long, about the size of a small quill, and knotted. The smell of ipecacuanha is slight, but disagreeable; the taste bitter, aromatic, and slightly acrid. The active ingredients reside chiefly in the cortex. It contains a feeble alkaloid called ceretin. Its preparations are pills, powders, lozenges, and wine. In large doses it is an emetic; in smaller ones it is an expectorant and an alterative. It is considered a specific in dysentery. "Dover's powder" is a compound powder of ipecacuanha and opium; it is diaphoretic and narcotic. Ipecacuanha, made into ointment, is a counter-irritant. (2) Various other plants produce a similar drug, as, for example, all the *Alsodineæ,* a tribe of *Violaceæ.* So also the root of *Euphorbia ipecacuanha* is said by Barton to be at least as good as the genuine ipecacuanha.

The ipecacuanha of Cayenne is *Ionidium ituba;* that of Guiana is the root of *Boerhaavia decumbens,* one of the nyctagos; that of Venezuela is the root of *Sarcostemma glaucum,* an Asclepiad; Black Peruvian or striated ipecacuanha is *Psychotria emetica;* the false ipecacuanha of Bourbon is *Camptocarpus mauritianus;* false Brazilian ipecacuanha is *Ionidium ipecacuanha;* undulated ipecacuanha is *Richardsonia scabra;* white ipecacuanha is (1) *Ionidium ipecacuanha,* (2) *Richardsonia scabra,* (3) in India, *Tylophora asthmatica,* and the wild ipecacuanha of the West Indies is *Asclepias curassavica,* called also bastard ipecacuanha.

Iphianassa (if-i-a-nas′sä), the daughter of Prætus, turned into a cow by Juno for pride.

Iphicles (if′i-klēz), the twin brother of Hercules, and father of Iolaus.

Iphicrates (if-ik′rä-tēz), a Greek soldier; born in Athens, 416 B. C. He won renown by his victories and his eloquence. He died in Thrace in 353 B. C.

Iphigenia (if″i-je-nī′ä), in Greek legend, a daughter of Agamemnon and Clytemnestra. When the Greeks, going to the Trojan War, were detained by contrary winds at Aulis, they were informed by Calchas, the soothsayer, that, to appease the gods, they must sacrifice Iphigenia to Diana, because her father had killed the favorite stag of that goddess. Rather than shed the blood of his daughter, Agamemnon, as chief of the Grecian forces, commanded one of his heralds to order the army to disperse. After much solicitation from the other chiefs, Agamemnon consented, however, to immolate his daughter for the common good of Greece; but as soon as Calchas had taken the knife and was about to strike the fatal blow Iphigenia suddenly disappeared, and a goat of uncommon size was found in her place. This supernatural change animated the Greeks, the wind suddenly became favorable, and the combined fleets set sail for Aulis. Iphigenia's innocence had excited the compassion of the goddess Diana, who carried her to Taurica, where she intrusted her with the care of her temple, whence she subsequently fled with her brother Orestes and his friend Pylades.

Ipomœa (-mē′ä), a genus of *Convolvulaceæ*, tribe Convolvuleæ. Sepals five; corolla campanulate; stamens five; style single; stigma bilobed; lobes capitate; ovary two-celled, each cell two-seeded. The species, which are numerous, are found in the warmer parts of both hemispheres. About 100 are cultivated in gardens for their showy flowers, which are an ornament to trellis-work. *I. tuberosa*, the Spanish arbor vine of Jamaica, furnishes a kind of scammony; the root of *I. pandurata* is employed in this country as jalap; *I. batatoides* is the male jalap of Mestitlan; *I. quamoclit* is sternutatory; *I. turpethum*, a native of the East Indies, and *I. operculata* are purgative. The foliage of *I. maritima* is made into a fomentation, and applied to joints enlarged by scrofula. The sweet potato was formerly called *I. batatas*, now it is *Batatas edulis*.

Ipsambul. See Abu-Simbel.

Ipsara. See Psara.

Ipsus, in ancient geography, a village of Asia Minor, in the kingdom of Phrygia, on a river of same name, famous for a great battle fought here between Antigonus and his son Demetrius against Seleucus, Ptolemy, Lysimachus, and Cassander, 301 B. C.; which battle ended in the death of Antigonus on the field, the flight of his son, and the division of his empire among the conquerors.

Ipswich, a parliamentary and municipal borough and river-port in England, capital of Suffolk, on the Orwell. It is pleasantly situated on a gentle declivity, and contains many interesting specimens of mediæval architecture. The public buildings include a fine town hall, a new postoffice, a custom house, county court house, cavalry barracks, theater, etc. The industries embrace agricultural implements, machinery, artificial stone, artificial manure, silk, tanning, ropes, lime and cement, brewing, ship-building, etc. Ipswich is a town of great antiquity. It was originally called Gippeswich, from the neighboring river Gipping. King John gave it its first charter. It sends two members to Parliament. Pop. (1901) 66,622.

Also, a town of Queensland, Australia, on the Bremer river, 23 miles W. of Brisbane. It is in a rich coal-mining district. Pop. (1901) with suburbs, 15,246.

Iquique (ē-kē′kā), the port and capital of the Chilean territory of Tarapacá (Peruvian till 1884). It has amalgamating works in connection with neighboring silver mines, a foundry, and exports saltpeter, borax, and iodine; imports (1898) 8,093,650 pesos; exports (1898) 65,301,015 pesos. The climate is hot, and drinking water has to be obtained by distillation. Earthquakes have more than once damaged the town. The roadstead is safe, and a mole has been built. Pop. (1904) 43,005.

Iquitos (ē-kē′tōs), a town in the Peruvian department of Loreto, on the left bank of the Marañon, about 75 miles above the mouth of the Rio Napo. It has an active trade, valued at $2,000,000 annually; the imports are exchanged mostly for india-rubber. Pop. (1900) 12,000.

Irade (i-rä′dē), a decree or command of the Sultan of Turkey directed to the grand vizier, whose duty it is to promulgate it to the public.

Irak Ajemi (ē-räk′ äj′e-mē) (Persian Irak), a central province of Persia, nearly coincident with ancient Media; area, 138,190 square miles; pop., estimated, 1,000,000. A great portion of the surface consists of elevated table lands, but there are also numerous fertile valleys only partly cultivated. The E. parts are occupied by the extensive salt desert of Dasht-i-Kavir. The industries are confined to the weaving of cloth and carpets, and the making of glass and porcelain. The province contains the principal towns of the kingdom, including Teheran, the capital, and Ispahan.

Irak Arabi. See Babylonia.

Iran. See Persia.

Iranian (ī-rā′ni-an) **Languages,** a family of languages belonging to the Indo-European stock, closely allied to the Indian group, and called by some philologists Persian, from the best-known member of the family. The two oldest known Iranian lan-

guages are the Old Persian of the cuneiform inscriptions and the Old Bactrian or Zend, the latter the language in which the Zend Avesta or sacred writings of the Parsees is composed. The Middle Iranian languages are the Pehlevi, and still later the Parsee, which are preserved in the commentaries to the Zend Avesta. The latter approaches pretty closely to the modern Persian. The most important of the New Iranian languages is the modern Persian, in which has been produced a very rich and celebrated literature. The Afghan or Pushtu, and the dialects of the Kurds, form separate branches of the Iranian family.

Irawadi, or Irrawaddy (ir-a-wäd′i) (said to mean, like Mississippi, "father of waters"), the principal stream in Farther India, E. of the Brahmaputra. It rises in lat. 28° N., lon. 97° 30′ E.; and, directing its course W. S. W., passes the cities of Amarapura and Old Ava. In lat. 21° 45′ it is joined from the N. W. by the Kyanquayn river; and in lat. 17° 50′ it divides into two branches, one of which, running to the S. W., passes the town of Persaim or Basseni; the other, running to the S. E., passes Rangoon; but these branches again subdivide into many streams, which are met by the tide. The intermediate space is formed into a delta, similar to that of the Nile. Among the banks of this river the greater part of the Burmese dominions is settled; and it is navigable for vessels of 200 tons burden as far up as Ava. Length, about 1,200 miles.

Irbit (-bit′), a town of the Russian government of Perm, 1,170 miles nearly due E. of St. Petersburg. Its celebrated fair, held in February, is next to that of Nijni-Novgorod, the most important in the empire. Pop. about 6,000.

Ireland (in Irish, *Erin;* in Latin, *Hibernia*), the more W. and smaller of the two principal islands of the United Kingdom, is separated from Great Britain on the E. by the Irish Sea, and surrounded on all other sides by the North Atlantic Ocean. Its greatest length, from Mizen Head in the S. W. to Fair Head in the N. E., is 300 miles; and the greatest breadth, from Carnsore Point in the S. E. to Benwee Head in the N. W., is 212 miles; the central breadth, nearly between the bays of Dublin and Galway, is 110 miles; area, 32,260 square miles; pop. (1910, est.) 4,458,775. Ireland is divided into four provinces—Leinster, Ulster, Munster, and Connaught—and into 32 counties; capital, Dublin; chief towns, Belfast, Cork, Limerick, and Londonderry.

Agriculture.—The climate is very favorable to vegetation. The mild temperature and humid atmosphere enable several delicate plants, which usually in the same latitude can only be cultivated in sheltered gardens, to flourish here with vigor in the open air; and forest trees often continue to retain their foliage after they have lost it in the warmer parts of England. No country ought to be richer in forest scenery than Ireland; and in early times large tracts of magnificent timber were spread over its surface; but waste and mismanagement have prevailed, trees have almost disappeared except from the parks of the gentry, and it is perhaps the worst wooded country in the middle latitudes of Europe. The evil of this is now being realized, and projects are afoot for the reafforesting of certain districts. However, one somewhat equivalent advantage derived from this treeless condition is seen in the large tracts, which might have been otherwise occupied, now giving employment to the plow or the spade, and serving to swell the amount of agricultural produce. Notwithstanding the great extent of her dismal moorland wastes few countries, in proportion to their area, have raised more human food, on an average of years, than Ireland. This is owing to the fertility of the soil. The arable surface is covered with a deep friable loam of remarkable richness. Seldom so light as to degenerate into sand, or so heavy as to contain an undue mixture of stubborn and impervious clay, the soils of Ireland possess that happy medium texture which at once facilitates the operations of husbandry and insures it an abundant return. In addition to the vegetable mold, which forms one of their most important ingredients, they consist, generally, either of the decomposed trap, so widely spread over the N. of Ulster, or of calcareous matters derived from the limestones which prevail in almost every other quarter. But there is perhaps no country in Europe where agriculture, considered as a system, has made less progress. The holdings, originally too small to be occupied by farmers of capital and enterprise, have been allowed in far too many cases to become almost infinitesimally subdivided, until they have been reduced to the smallest patches on the produce of which a family could manage to subsist. The result of this is that the holders have been compelled to raise as much as possible in each year for immediate use, without regard to the ultimate effect of this mode of farming upon the land. Over-cropping is thus an evil which prevails very widely, and the soil of Ireland has deteriorated under this treatment. Yet the deterioration would seem to have ceased some time ago (perhaps as a result of the decrease in small holdings), for if we compare some of the years between 1850 and 1860 with some of those near the present day the average produce of the soil per acre will be found to have increased rather than diminished. The figures show a decrease in the area under cereal

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and green crops, and an increase in the area under meadow and clover, and the change in this direction is still going on. Between 1851 and 1881 the farms of from 1 to 15 acres decreased in number by 66,363. The total number of holdings in 1891 was 486,865, or 12,244 less than in 1881. In 1903 the number had risen to 544,625, in 1904 to 545,902, and in 1905 to 593,804—an increase of 106,939 over that of 1891—the increase being largely in holdings of one acre (2,300), 5 to 15 acres (270), 30 to 50 (282), and 50 to 100 (24) acres. Between 1841 and 1899 there was a total decrease in holdings "above 1 acre" of 25 per cent.

TABLE SHOWING EXTENT UNDER CROPS IN IRELAND IN 1856 AND THE FOUR YEARS ENDING 1906

Year	Extent under Cereal Crops	Extent under Green Crops	Under Meadow and Clover
	Acres	*Acres*	*Acres*
1856	2,785,208	1,547,746	1,302,787
1903	1.306,345	1,323,874	1,236,035
1904	1,279,199	1,094,776	1,297,164
1905	1,271,190	1,090,531	1,255,133
1906	1,309,343	1,089,855	2,218,573

The Land Act of 1870 greatly improved the conditions of tenure in Ireland. Its chief aims were to provide compensation to tenants for arbitrary eviction and especially for improvements effected by them on their holdings in case of their being disturbed in their possession by the landlords, and to afford facilities to tenants for the purchase of their holdings. The act legalized what is called the Ulster tenant-right custom in all the districts in which it prevailed, and decreed the amount of compensation to be awarded in absence of such custom. In 1881 it was supplemented by a more thorough and comprehensive measure. The benefits conferred on Irish tenants by this act may be briefly summarized under the terms "fair rent," "fixity of tenure," and "free sale." By the first of these every tenant who objects to his rent, or the rent the landlord wishes to exact, is entitled to have a "fair rent" fixed for him by a court. This rent remains unaltered for 15 years, at the end of which period it may be readjusted, and either raised or lowered. By the principle of "fixity of tenure" the law recognizes that the tenant has a certain right in his holding in virtue of which he is not to be arbitrarily removed from it without compensation, and which enables him on leaving his farm to obtain the best price he can get for yielding up his possession. The "free sale" of this right of tenancy is restricted only in so far as that it must be to one person only (except under agreement with the landlord), that the landlord may object on sufficient grounds to the person purchasing, and that he also has the right of preëmption. At the expiration of the 15 years the landlord may resume possession of the holding on paying the tenant compensation for improvements effected by him, and also paying him the value of his tenant-right, both being determined by the court should the parties be unable to agree. A tenant who sells his tenant-right on quitting his holding is not to be entitled to compensation for disturbance, or if he has received compensation he is not entitled at that time to sell his tenancy. A tenant holding under the Ulster tenant-right may sell under that or under this system, but not partly under one and partly under the other. The act also empowers the Land Commission to advance loans to tenants not exceeding three-fourths of the value of their holdings, to enable them to become proprietors, and such loans are repayable by an annual payment of 5 per cent. for 35 years. Provision is also made for assisting emigration. A tenant whose holding, or the aggregate of whose holdings, is valued at not less than £150 is entitled by writing to contract himself out of any of the provisions of this act, or of the act of 1870. Another act passed in 1887 extends the privileges conferred by the

TABLE OF AREAS UNDER CULTIVATION AND CROPS, 1902-1906

		Wheat	Barley	Oats	Beans	Peas	Potatoes	Turnips and Swedes
1902	Acres	44,244	167,877	1,082,144	2,318	347	629,304	286,506
	1,000 bushels.	1,602	7,945	53,801	102	10	2,726*	4,947*
1903	Acres	37,596	158,791	1,097,538	2,080	290	620,393	287,548
	1,000 bushels.	1,176	5,836	48,289	85	9	2,363*	3,596*
1904	Acres	30,825	158,043	1,078,772	1,890	185	618,540	285,831
	1,000 bushels.	1,040	5,260	49,347	73	5	2,642*	4,997*
1905	Acres	37,800	154,645	1,006,806	1,471	253	616,755	282,195
	1,000 bushels.	1,430	6,893	49,850	60	7	3,423*	4,722*
1906	Acres	43,880	176,544	1,678,810	1,961	305	616,167	278,367
	(Produce not available.)							

* 1,000 tons.

TABLE SHOWING LIVE STOCK IN IRELAND, 1874 AND 1903-1906

	1874	1903	1904	1905	1906
Horses	468,089	532,884	585,952	534,875	541,343
Cattle	4,118,113	4,664,112	4,676,718	4,645,215	4,681,099
Sheep	4,437,613	3,394,604	3,827,919	3,749,352	3,789,675
Pigs	1,096,494	1,383,516	1,315,126	1,164,316	1,257,279

act of 1881, and a third act passed in 1896 goes further in the same direction. The Purchase of Land (Ireland) Act of 1891 supplied the Land Commission with further funds for advances to tenants to enable them to purchase their holdings, and the Land Bill of 1903 goes further still (see end of this article).

Manufactures and Trade.—The linen manufacture in Ireland is its most important staple, and in every article, except lace and cambric, competes successfully with all other countries. It has increased in a remarkable manner within the last 40 or 50 years, and Belfast, its center, has now become the first city of Ireland in population as well as in manufacturing industry. The linen manufacture, indeed, is of importance for the whole of Ulster, the number of hands employed being 76,500. In 1906 there were 15,000 acres of flax under cultivation, an increase of 20 per cent. over 1905. The cotton manufacture has had a very different history, the number employed in this industry having declined from 4,000 in 1868 to 800. The woolen manufacture at the outset outstripped that of linen. It had made such progress as to alarm the woolen manufacturers of England, who, in a spirit of petty jealousy, petitioned the English Parliament for its discouragement, and succeeded. The Irish were prohibited from sending their woolens abroad, and could not even send them into England without paying an oppressive duty. Had the manufacture been suited to the country it might have surmounted all this absurdity and injustice, and at all events, when these ceased to operate, would have revived. But the woolens of Ireland continue to be of very secondary importance, and indeed the manufacture seems to have much decreased in recent years. The manufacture of Irish poplins (of woolen and silk, or woolen and flax or cotton) is very flourishing. There are about 20 mills engaged in paper-making. The brewing of porter and distillation of whiskey form important items in the national production. The 39 beer breweries produced in 1901 over 3,000,000 barrels, and the 30 whiskey distilleries produced in 1901 14,200,000 gallons, employing about 6,000 people. Sewed muslins, cambric handkerchiefs made on handlooms, lace, and hosiery may also be mentioned. The work of the "Sinn Fein" (ourselves alone) has given a great impetus to the demand for Irish-made goods, which are put forth under the registered trade-mark of the society.

The trade of Ireland is not at all proportioned to her natural capabilities and the admirable facilities afforded by the excellent harbors situated on her coasts. The most important article of export is raw produce, the greater part of which finds its market in Great Britain. It consists

chiefly of grain and flour, live stock, salt and fresh meats, eggs, butter, etc. There are 609 steam factories producing 479,000 hundredweights of butter annually, and 328 cooperative creameries producing 20,000,000 pounds of butter in 1904, representing a value of over £1,000,000. Manufactured articles, particularly linen, rank next in importance; but as the bulk of such articles is very small in comparison with their value, the trade, or at least the shipping connected with them, holds only a secondary place. The trade with foreign countries is also inconsiderable. The principal imports are colonial produce, woolen and cotton goods, wheat, wool, coals, and salt. Of the shipping employed in this trade only a mere fraction is Irish. Ship-building is increasing. In 1906 24 vessels were launched, representing 148,716 tons, an increase of 3 vessels and 5,239 tons over 1905. The value of the exports direct from Ireland to foreign parts was about £906,618 in 1883, of imports from foreign parts, £10,633,324; in 1900 they were £1,312,048 and £12,014,597 respectively, and in 1905 they were £1,888,000 and £12,394,000. The banking statistics also show improved conditions. In 1902 the joint stock bank deposits were £48,845, and in 1906 £53,959. The postal figures show that from 118,000,000 letters delivered in Ireland in 1896 the number fell to 115,800,000 in 1906.

Fisheries.—The salmon and trout fisheries are very valuable, and are increasing in value every year. With an increased supply of fish high prices are maintained owing to the improved means of communication for remote districts with the best markets. In spite of this, however, these fisheries are not cultivated to anything like so high a degree as they might be. Still, the number of men engaged in these fisheries in Ireland is over 12,000, the estimated value of the salmon and trout catch exported being from £350,000 to £400,000 annually. The principal sea fisheries of Ireland are those of herring and mackerel. The herring fisheries in the Irish waters are prosecuted chiefly on the E. coast by Irish boats from Howth, Arklow, and other places on the Irish coast, and by a fleet of vessels from Cornwall, Scotland, and the Isle of Man. The number of boats engaged in this branch of the sea fishery is much smaller than in Scotland, from which considerable quantities of cured herrings are imported. The total number of boats engaged in the sea fisheries is now between 6,000 and 7,000, the number of men and boys employed being about 25,800. The native fishermen, it is said, are now successfully competing with their rivals, yet the sea fisheries of Ireland on the whole have much declined, as shown by the decrease from 55,630 hands and 13,483 boats, employed in 1860, to the figures just given.

Means of Communication.—The rivers of Ireland form excellent navigable channels. In several of them, however, when the water was low, the navigation became seriously impeded by rocky shoals. In removing these, or in making artificial cuts for the purpose of avoiding them, vast sums have been expended. Improvements of equal importance have been made by the construction of canals; but since the introduction of railways, canals have become of secondary importance. The principal canals are the Grand canal, the Royal canal, the Barrow Navigation, the Newry Navigation, and the Lagan Navigation. With the exception of the Barrow Navigation, the Grand canal, and the Lagan Navigation, the dividends paid by the Irish canals in the possession of public companies are almost nominal. The Royal canal yields a profitable return, but it is merged in the Midland Great Western railway. The Grand and Royal canals connect the important systems of the Shannon Navigation with Dublin. There are in all 586 miles of canals open for traffic, carrying in 1905 708,674 tons, with an expenditure of £90,655, and a revenue of £114,714. The railway system of Ireland has attained a considerable development. The lines are all constructed on a gauge of 5 feet 3 inches, which is compulsory. The average cost of construction, including carrying stock, was about £16,000 per mile. The principal Irish railways are the Belfast and Northern Counties railway, with a total length of 180 miles; the Dublin, Wicklow, and Wexford railway, 135 miles in length; the Great Southern and Western, 478 miles; the Midland Great Western railway, 425 miles (including the Dublin and Meath, Great Northern and Western, etc.); the Great Northern of Ireland, 503 miles (including the Dublin and Belfast Junction, 63 miles, and the Ulster railway, 140 miles); and the Waterford and Limerick railway, 141¼ miles, or including the lines of other companies worked by it, 269 miles in length. Few of the Irish railways pay any dividend at all; but those that do pay represent a large proportion of the capital invested in railways in Ireland, and some of them are very remunerative concerns. The most profitable of them are a short one connecting Dublin with Kingstown, the Belfast and Northern Counties, and the Ulster railway. At the end of 1905 the total length of railways completed and open for traffic was 3,312 miles, representing a capital of £38,405,255; the total receipts from the carriage of passengers and freight amounted to £4,108,678.

Public Works.—Large sums have been advanced in loan by the sanction of the Imperial Parliament under various acts for public works, etc., in Ireland. The Irish Board of Public Works has charge of such grants and their expenditure, the objects

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to which they are applied including landed improvements and drainage; fishery piers and harbors; roads, bridges, and public buildings; tramways, light railways, and certain lines of inland navigation; the preservation of ancient monuments; and latterly, the commissioners may lend for the purpose of any work for which county or borough councils are authorized to borrow. Of £24,228,038 of loans advanced for purposes that have not yet been fully carried out ("current services") £13,531,079 has been repaid, besides interest amounting to £7,141,423, while the sum of £1,597,050 has been remitted. The largest item of this expenditure, namely £5,239,220, has been spent on the improvement of lands; river drainage and navigation have absorbed some £2,967,500, while on lunatic asylum buildings there has been spent £2,620,385, in schemes for the improvement of public health £2,690,278, under the Laborers' Acts £1,830,188 (to provide employment, etc.), on railways £1,200,127, in advances to occupants for improvement of holdings £1,071,106, roads and bridges £1,008,244. Other sums have been spent on harbors and docks, reclamation of lands, dwellings for the poorer classes, teachers' residences, dispensaries, and, since the recent land acts, in advances to tenants for the purchase of their farms.

Religious Bodies.—The conversion of the Irish to Christianity is generally ascribed to St. Patrick, a native of Scotland, who is said to have received his mission from Pope Celestine, and to have been raised to the archiepiscopal chair of Armagh. It appears that till the 12th century the Pope's authority in Ireland was not recognized, and that long before that time a regular hierarchy had been established there with numerous bishops. Until the arrival of the English in Ireland the number of its sees and the succession of its bishops, etc., are involved in great obscurity.

The Reformation never made much progress in Ireland, and though a Protestant Episcopal Church was established by law, it was only the church of a small minority. In 1871 it was disestablished, the Irish Church Act of 1869 then becoming effective.

Previous to this time the clergy were supported by a tithe rent charge, the proceeds of the church lands, etc., the total annual income of the church, including the value of houses and lands in occupation, being £613,984. By the act of disestablishment the position of the church and of its clergy was entirely changed, though those holding benefices at the time of its passing have not suffered loss. The property and tithes formerly belonging to the church are now vested in commissioners, who pay to all deprived of income by the act, so long as they continue to discharge the duties of their offices, such an annual sum of

money as they would otherwise have received, deduction being made of curates' salaries, and other outgoings to which the parties would have been liable, and regard being paid to the prospective increase of incomes by the falling in or cessation of such charges; or instead of an annual sum, an equivalent single payment has been made to such as have commuted their claims in that manner. The Irish Church accordingly is no longer a state church, and none of its bishops have now a seat in Parliament. It is still a vigorous and flourishing institution, however, and possesses funds amounting to over £8,128,000. Of this upwards of £5,000,000 has been voluntarily contributed by friends of the church since it was disestablished. While disestablishing the Irish Church, the act at the same time declared the cessation of the Maynooth grant and the *Regium Donum*. The affairs of the Irish Church are now managed by the twenty-three diocesan synods and by the general synod in conjunction with the representative body. The supreme legislative powers reside in the general synod which meets in Dublin, and is composed of the Archbishops of Armagh and Dublin and the 11 bishops, and of lay and clerical representatives from the different dioceses; the lay representatives being more than twice as numerous as the clerical. The representative body incorporated in 1870 consists of the archbishops and bishops *ex officio*, 39 lay and clerical elected members (three for each diocese), and 13 coöpted members elected by the other two classes conjointly. This body is empowered by its charter to hold church property, subject to the regulations of the general synod. The church uses the Book of Common Prayer, as revised in accordance with statutes passed by the general synod, and furnished with a preface containing an exposition of its formularies in the sense in which they are understood by the church. In 1901 there were 1,700 Protestant clergy and 1,400 churches.

At the head of the Roman Catholic Church in Ireland are four archbishops, who take the titles of Armagh, Dublin, Cashel, and Tuam, and 24 bishops. They are all nominated by the Pope, generally out of a list of three names presented to him by the bishops of the province and the clergy of the vacant diocese. In many of the dioceses there are a chapter and cathedral corps, the dean being appointed by the cardinal-protector at Rome. The other dignitaries are the vicars-general, commonly one, two, or three to a diocese, according to its extent, who have special disciplinary and other powers; the vicars-forane, whose functions are more restricted, and of whom most dioceses have one or more up to 10; and the archdeacons. All of these are nominated by the bishop, who has also the

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exclusive nomination of the parochial clergy. The Irish Roman Catholic clergy are supported by voluntary contributions. Their incomes are derived from fees paid at marriages, baptisms, and deaths, Easter and Christmas dues, and incidental contributions in money or labor. There are numerous monasteries and convents. The seminaries for the education of the priesthood are the College of Maynooth, founded in 1795 and formerly supported by an annual charge of the Consolidated Fund of £26,360, which was abolished by the Irish Church Act of 1869, a sum of £372,331 having been paid in compensation; and the colleges of St. Patrick, Carlow; St. Jarlath, Tuam; St. John, Waterford; St. Peter, Wexford; St. Colman, Fermoy; St. Patrick, Armagh; etc., all supported by voluntary contributions.

The Presbyterian Church of Ireland is chiefly confined to the province of Ulster, where it may be said, more especially in the counties of Down and Antrim, to be the leading religious denomination. Its ministers are supported by voluntary contributions, seat rents, and church funds. They were formerly aided by an annual grant from government, called the *Regium Donum*, the amount of which paid in 1869 was £40,547. This annual grant, however, was abolished, as already mentioned, by the Irish Church Act of 1869, and was commuted to a single sum of £701,372 paid to the church. According to the census of 1901 there were in Ireland 3,308,661 Roman Catholics, 581,000 Protestant Episcopalians, 453,173 Presbyterians, 62,006 Methodists, 8,094 Unitarians, 7,062 Baptists, and 3,898 Jews.

Education.—The principal educational institutions are Dublin University and the Queen's Colleges of Belfast, Cork, and Galway. The latter were formerly connected with an examining and degree-conferring body (Queen's University), for which the Royal University of Ireland was substituted in 1882, in pursuance of the University Education (Ireland) Act, 1879; £20,000 being yearly granted from the surplus funds of the Irish Church. The Queen's Colleges, however, are not directly affected by this act. The Royal College of Science for Ireland was established under the authority of the Science and Art Department, London, in August, 1867. Its object is to supply a complete course of instruction in science applicable to the industrial arts, and to aid in the instruction of teachers for the local schools of science. There are professors of physics, chemistry, botany, zoölogy, agriculture, mining, geology, applied mathematics, etc. The course of instruction extends over three years. There is also the Catholic University of Ireland, established in 1854, and consisting of colleges at Dublin, Maynooth, Carlow, etc., sending up

students for examination at the Royal University of Ireland; the General Assembly's Theological College, Belfast; the Magee College, Londonderry, a Presbyterian college opened in 1865, and embracing in its curriculum literature, science, and theology; the College of St. Columba near Dublin, founded for the purpose of establishing a system of instruction preparatory to the university, etc.

There are numerous schools, some of them of royal and private foundation and endowed, but the most prominent are those established since 1831 under the superintendence of the commissioners of national education. These schools are open to the children of parents of all denominations. The pupils are not required to attend any religious exercise or religious instruction of which their parents or guardians disapprove, and opportunity is given to pupils of each religious persuasion to receive separately at appointed times such religious instruction as their parents or guardians may approve of. Of these schools there were 8,670 in operation in 1899, with 785,139 pupils on the rolls. The average daily attendance was small, being only 513,852. In 1892 an act was passed by which a beginning was made of free education, and a modified system of compulsion. In 1878 an act was passed for the promotion of the intermediate secular education of boys and girls in Ireland. By this act £1,000,000 from the Irish Church surplus fund was set apart, being invested in commissioners who are to apply the revenue arising from it to the purposes of the act, these being (1) the carrying on of a system of public examinations; (2) the awarding of exhibition prizes and certificates to students; and (3) the payment of results fees to the managers of schools fulfilling certain prescribed conditions. The schools referred to in the act are of a grade superior to the national schools. The subjects of examination are Latin and Greek, modern languages, Celtic, natural science, mathematics, etc. The income of the Intermediate Educational Board in 1905 was £82,988, including the local taxation revenues. In 1891 6,952 students were presented for examination; in 1905 there were 9,677, of whom 7,018 were boys and 2,659 were girls.

Technical instruction in Ireland is controlled by the Technical Institute of the Department of Agriculture. In 1903-1904 a programme of experimental science was adopted in 329 secondary schools with 8,600 pupils. Throughout Ireland technical instruction is being organized under the councils of county boroughs, urban districts, and counties. In 1904 urban and county schools, and classes for non-agricultural schools, were attended by 39,398 students. The annual grant was £55,000, £25,000 for technical instruction in county boroughs, and £30,000 for the same purpose elsewhere. The sum set aside for public education in 1906-1907 was £1,393,293, for the National Gallery £4,266, and for Queen's Colleges £5,771.

Government, People, etc.—Ireland by the Act of Union became an integral part of the United Kingdom and shares in its legislation by means of 76 peers and 103 representatives in the House of Commons. The representative peers are elected for life by the whole body of Irish peers. In 1906 there were 691,423 electors, of whom 12,510 were illiterate, and the vote polled was 135,282. The lord lieutenant, who represents the sovereign, holds his court in the castle of Dublin. Since the census of 1841, when the inhabitants of Ireland numbered fully 8,000,000, the population has almost steadily decreased. In 1846-1847 a frightful famine, occasioned by the potato disease, broke out, and was followed by a visitation of fever and cholera. The population was in consequence greatly reduced, and since then emigration has taken the place of famine and disease in reducing it further. The extent of this emigration will be gathered from the fact that 3,754,899 souls left the country between 1851 and 1899, or an average of 80,000 yearly. From 1891 to 1900 the number was 460,917, about 46,000 per annum; from 1901 to 1905, 235,450, 47,000 per annum, and in 1906, 52,292 left Ireland, 45,407 coming to the United States and 4,479 going to British North America. The decennial decimal rate of decrease in population since 1861 is as follows: 1861, 11.8; 1871, 6.7; 1881, 4.4; 1891, 4.7; 1901, 5.2.

From the causes just referred to, the total population of Ireland, which might by natural increase have amounted to at least 10,000,000, had dwindled away to 4,458,755 in 1905. The smaller number, however, live in far greater comfort than did the larger. Very much has been accomplished for the amelioration of the condition of Ireland, not merely by the improvement of the land, but by the erection of a better class of farm-buildings and homesteads and dwellings for the peasantry. That the standard of living is much raised throughout Ireland is shown by an immensely increased consumption of meat, bread, tea, coffee, and sugar, and by the improved dress of both men and women. The statistics of the post-office savings banks are also an indication of improved conditions. In 1894 the amount of deposits was £1,864,165, and in 1905 it had risen to £2,725,066, with 484,310 depositors. The deposits in the trustee savings banks were £441,376 in 1894, and £466,197 in 1905, with 53,670 depositors. The Raiffeisen banks, which are coöperative associations formed to lend to members and to receive deposits for definite objects, such as buying agricultural machinery, seeds, etc., are proving of great benefit to the farmers, and are rapidly

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growing in favor. The occupations of the people of Ireland at the last census are thus classified: Professional, 131,035, including 32,674 females; domestic, 219,478, including 193,271 females; commercial, 97,889, including 5,026 females; industrial, 639,413, including 233,466 females; agricultural, 876,062, including 83,587 females; non-productives, 494,958.

History.—The beginning of the history of Ireland is enveloped in fable. Among the ancients it was known at least as early as the time of Aristotle, who calls it Ierne. In Diodorus Siculus it is called Iris; in Strabo, Ierne; in Pomponius Mela, Iverna; in Pliny, Hybernia. Yet the information to be found about Ireland in the works of the ancient geographers and historians is altogether very scanty. The bardic historians of the country speak of Greek and Phœnician colonies, give lists of kings, etc., for which there is no authentic foundation. The vernacular language of the Irish proves that they are a part of the great Celtic race which was once spread all over Western Europe. The oldest and most authenticated Irish records were written between the 10th and 12th centuries; some of them go back, with some consistency, as far as the Christian era; but there is no evidence that the Irish had the use of letters before the middle of the 5th century, when Christianity and Christian literature were introduced by St. Patrick. The new faith did not flourish till a century later, when St. Columba erected monasteries. The repose which at that time the island enjoyed, while Southern Europe was overrun by Germanic hordes, favored the growth of a learned class of monks. Even in the 6th century Ireland became the seat of Western learning; and its monasteries were the schools whence the missionaries who disseminated the Christian faith throughout continental Europe proceeded. The monasteries founded by them on the Continent, principally in South Germany, long bore the name of Scotch monasteries, as some of them do still. In the 8th and 9th centuries the scholars of Ireland were among the most distinguished at the courts of Saxon kings, and of Charlemagne. But when the Northmen commenced their descents on the coasts, the ecclesiastics took to flight; and it is evident, from the condition of the people at a later period, that the learning of the Irish clergy did not then extend beyond the walls of the monasteries. Divided among a number of barbarous and hostile chiefs, Ireland had been for a long time torn by internal wars and for nearly two centuries ravaged by the Danes, when, in the beginning of the 11th century, Brian Boroimhé (the Conqueror) united the greater part of the island under his scepter, restored public tranquillity, and subdued the Northern invaders. These latter had by this time been converted to Christianity, and at the synod of Kells, in 1152, the whole island came under the papacy, and the Archbishop of Armagh was raised to the primacy.

After the death of Brian the island relapsed into its former state of division and anarchy. Frequent wars kept the inhabitants in a state of great barbarism, and rendered them weak against any foreign foe. In this state of matters Henry II. of England conceived the design of conquering the island, and came to an understanding with the Pope, Adrian IV., regarding the enterprise, in consequence of which the latter in 1155 granted him a bull giving him the right to conquer the island, and arranging for the division of the advantages of conquest between himself and the king. Owing to the internal troubles which then engaged the attention of Henry in England some time elapsed before he could take any steps to effect the conquest which the Pope had authorized him to attempt; but at last a circumstance occurred which gave him the desired opportunity. Dermot, Prince of Leinster, had carried off the wife of O'Ruarc, Prince of Leitrim, who then secured the help of Roderick O'Connor, Prince of Connaught, who claimed a certain measure of authority over the whole island, and with his aid drove Dermot out of his dominions (1167). Dermot then went to Aquitaine, where Henry II. of England at that time happened to be, did homage to him as superior of the island, and obtained his permission to enlist English subjects to assist him in recovering his dominions. After Dermot had been restored to his possessions by the Welsh barons, Robert Fitzstephen and Maurice Fitzgerald, and Richard de Clare, Earl of Pembroke, had made himself master of Waterford and Dublin, Henry himself appeared in person in Ireland in October, 1171, accompanied by 400 knights and 4,000 foot soldiers; but he took no warlike means to establish his authority. As he supported his claims by a papal bull, the clergy of Ireland were from the first disposed to favor them, and the Princes of Leinster and Munster, won by Henry's cordial behavior toward them, very speedily submitted and acknowledged the English supremacy. The native chiefs still maintained their independence.

In 1315 Edward Bruce, brother of the King of Scotland, landed in Ireland at the head of a Scotch force, and caused himself to be crowned king of the island; but not being vigorously supported by the Irish, who had invited his assistance, he was defeated by the English in a battle fought near Dundalk, in which he himself was slain, and the Scotch were obliged, in 1318, to return. The English territory in Ireland (generally known as "the Pale") was governed by various nobles subject to a viceroy. The subjection was, however, sometimes little more than nominal. The nobles quarreled among

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themselves, and were often at open feud. The beginning of the reign of Edward III. (1327) was marked in Ireland by the outbreak of civil strife in every part of the English Pale, advantage of which was taken by the Irish races for a general rising, which threatened the safety of the English colonists, and which the government found itself unable to subdue, until it yielded to the demands of the barons in Ireland, by granting them complete civil and military jurisdiction in their own districts. During the wars with France some Irish troops served in the English armies, and the common sympathies induced by that circumstance seemed likely to promote a better state of feeling between the two races, when the breach was made wider than ever by the celebrated statute of Kilkenny (1367), framed under the viceroyalty of Lionel, Duke of Clarence, son of Edward III., forbidding, under severe penalties, intermarriages between English and Irish, the assumption of Irish names by persons of English blood, the use of the Irish language and the native (Brehon) law, etc. In consequence of this the disturbances between the Irish and English inhabitants of Ireland increased so greatly that the English viceroy found it necessary to protect the Pale by payments of money to the Irish chiefs, and this state of matters continued during the reigns of Richard II., Henry IV., and Henry V., until, in that of Henry VI., Richard, Duke of York, was appointed governor of the island, who succeeded by his politic measures in restoring peace.

An attachment to his descendants continued to influence the Anglo-Irish during the reign of Henry VII., as it appears from the aid which the impostors put forward by the adherents of the house of York derived from Ireland. In the reign of Henry VII. (1494) was enacted Poynings' Law (so called from Sir Edward Poynings, lord deputy of Ireland), which provided that all former laws passed in England should be in force in Ireland and that no Irish Parliament should be held without previously stating the reasons on account of which it was to be summoned, and the laws which it was intended to enact. The power of the English government in Ireland was thus strengthened, but nothing was done to improve the condition of the native Irish, whom the oppressive severity of the English yoke embittered without subduing. At the beginning of the 16th century the greater part of the island still remained unconquered by the English. The native Irish still lived according to their old constitution under their own chiefs, and in manners and modes of life were still partly uncivilized. In 1542 Henry VIII. received from the Irish Parliament the title of King of Ireland, instead of lord, which he had before borne, as a vassal of the Pope; but he did nothing to extend the English sway or to improve the social circumstances of the people. The Reformation which took place in England during this reign took but a slight hold on Ireland even in the English districts; but the monasteries were suppressed and the tribute to the papal see abolished. Under Edward VI. the deputy proposed to the Irish Parliament the adoption of the Reformation; but Mary was easily able to undo all the little that had been done in this direction by her two predecessors. Elizabeth, in 1560, caused the measures adopted in the reign of Mary to be abrogated, imposed a Protestant clergy on the people, and in their behalf confiscated the entire ecclesiastical property of the Roman Catholics. She endeavored to improve the condition of Ireland, and employed able men to effect her purposes, yet her reign was marked by a series of risings which finally terminated in a general war against England, usually called the rebellion. Hugh O'Neil, who had been raised by the queen to the dignity of Earl of Tyrone, instigated by the Pope, and supported by the Spaniards, was the leader in this war, which, though successfully begun, ended with the complete defeat of the insurgents, and the reduction of the whole island by the English (1603). More than 600,000 acres of land were taken from the Irish chiefs, and for the most part distributed among English colonists.

The reign of James I. (1603-1625) was, on the whole, favorable to Ireland; the arbitrary power of some of the chieftains was restrained, the administration of justice improved, etc.; but the means which he took to effect some of these improvements were certainly sufficiently tyrannical. He demanded from every Irish chief the document on which he rested his claim to his property, and if it was not to be found or contained even any formal error, his lands were forfeited to the crown. Of 800,000 acres of land which in this way came into the hands of the king in the N. of the island, a large share was entirely withdrawn from the Irish, and divided among Scotch or English settlers. In addition to this, the Catholics, on account of the oath of supremacy by which all public officers were required to acknowledge the king as head of the Church, remained excluded from all official appointments. The recusants were encouraged by the Pope, who established a Roman Catholic hierarchy alongside of the Protestant one in the island. In the reign of Charles I. (1632), Wentworth, afterward Earl Strafford, was appointed lord deputy, and his administration was beneficial to the country. But the republican inclinations of the English residents, the hate which existed between them and the Irish Catholics, the influence of the Irish clergy who were educated in foreign countries, with other circumstances led in 1641 to an attempt to shake off the

English yoke. Dr. Lingard says of this insurrection that it has been usual for writers to paint the atrocities of the natives, and to omit those of their opponents, but that revolting barbarities are equally recorded of both, and that if among the one there were monsters who thirsted for blood, there were among the other those who had long been accustomed to deem the life of a mere Irishman beneath their notice.

After the death of Charles, Cromwell was appointed (August, 1649) lord lieutenant of Ireland, and with his usual energy and promptitude, but with great cruelty, reduced the whole country within nine months. The greater part of the possessions of the Catholics were confiscated. Charles II. restored the fourth part of the confiscated estates to the Irish, and James II. appointed Tyrconnel, a Catholic, lord lieutenant of Ireland, and filled the Parliament with Catholics.

But the sudden deposition of James from the English throne changed the face of matters. Almost at the same time that information was received that William had ascended the English throne and meant immediately to send troops and supplies into Ireland, intelligence came that James had landed in Munster with an army. On March 24, 1689, he entered Dublin. His promises of protection to the Protestants were rendered very suspicious by the solemn procession with which the Catholic clergy welcomed him into Dublin, and in a very short time unequivocally proved to be insincere. As the Protestant strength lay chiefly in the N. of Ireland, James resolved to direct his march thither. Londonderry was to be first reduced. In this city Lundy commanded, a man suspected of attachment to James, but to whom William, in the midst of his embarrassments, had been obliged to commit this important place. The suspicion that attached to him was too well founded. He refused to defend the town; and had it not been for the skill and intrepidity of George Walker, a clergyman, James would instantly have gained admittance into it. The inhabitants, encouraged by him, resolved to defend the town, and elected Walker and a Major Baker their governors. From April 17 to July 29 the town was closely besieged, and though poorly provided for defense, it gallantly held out, enduring the last extremity of famine, till it was relieved on the latter date by some ships from England, which broke the boom that had been stretched by the besiegers across the Foyle river below the town. The inhabitants were now saved from famine, and as it was on famine alone that the besiegers had trusted for success, they immediately retired. On Aug. 16 in the same year Marshal Schomberg arrived in Ireland with troops from England, but little was effected till the following year (1690), when King William arrived in person, and on July 1 gained a decisive victory over the forces of James on the Boyne river not far from Drogheda. On July 13, 1691, another victory was gained over the Irish at Aughrim in Galway, and on Oct. 3, Limerick, the last place in Ireland that held out for James, capitulated, a treaty being concluded at the same time with General Ginkel on behalf of the English, according to which the Catholic Irish were to be allowed the free exercise of their religion, as had been granted by Charles II. More than 12,000 Irish who had fought on the side of James went into voluntary exile.

The treaty of Limerick was very ill kept by the English, a fact which is commemorated by the name which the Irish still give to the place at which it was concluded, "The City of the Violated Treaty." By a decree of the English Parliament upward of 1,000,000 acres of land were now confiscated and divided among Protestants. In order to keep down every movement of the Catholic population cruel penal laws were passed against those who adhered to that form of religion. By these laws the higher Roman Catholic ecclesiastical dignitaries were banished from the island; the subordinate priests were not allowed to leave their counties; no Roman Catholic could hold a public office, acquire landed property, enter into a marriage with a Protestant, etc. Though these laws were not always rigorously carried out by the Protestant officials, yet they naturally excited great bitterness of feeling among the Roman Catholics and were the cause of most of the frequent revolutionary associations which mark the subsequent history of Ireland. About 1760 the Whiteboys association was formed. It consisted of starving day-laborers, ejected farmers, and others in a like condition, who used to assemble at night to destroy the property of hard landlords or their agents, the Protestant clergy, or any others that had made themselves obnoxious in the neighborhood. In many cases they did not confine their acts of aggression merely to plunder and destruction, but even went the length of murder. After accomplishing what they had been assembled for, they secretly disappeared, and as no person could give evidence against them without having to fear their vengeance, they usually remained beyond the reach of the law. They took the name of Whiteboys from their wearing white shirts over their dress on their nightly depredations. They were also called Levelers, because one of their chief employments was to level the fences which had been set up round newly inclosed land.

About the same time as that of the Whiteboys, the association calling themselves Hearts of Oak arose to resist the burdensome taxes imposed for the construction

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of roads. All this, however, did not ameliorate the general condition of the country, and it was not till the American War of Independence taught the English government the folly of attempting to govern a people by coercion that the severity of the laws relating to Ireland was mitigated. In 1778 the penal laws against the Catholics, though not repealed, were made much more lenient. Catholics were henceforth permitted to acquire landed property, to erect schools, and to observe their own religion under fewer restrictions. In 1783 Poynings' Law was repealed and freedom of legislation allowed to the Irish. In spite of all these alleviations of their condition there was still at least one thing that was felt by the Catholics as a special grievance, and this was the payment of tithes for the support of the Protestant clergy, while they had at the same time to provide for their own church. The rigor with which many of the Protestant ministers exacted these tithes at last brought about the formation of a secret society, the members of which called themselves Right Boys (1786). They made the people promise on oath not to pay these tithes, or at least not more than a certain amount, and punished those who broke their word.

The outbreak of the French Revolution had naturally a great effect on the minds of the Irish people. It called forth expressions of enthusiasm for the cause of liberty and sympathy with the leaders of that revolution, and begot the most extravagant hopes for themselves. Out of a corps of volunteers which had been formed in 1779 but which had been dissolved a few years later, a society was formed calling itself the Society of United Irishmen, which included in it many Protestants and which secretly endeavored to bring about a revolution which should convert Ireland into an independent republic. The Catholics at the same time took advantage of the embarrassment of the British government to demand equal rights with the Protestants, and the government gave in to this demand so far as to remove the hindrances which had been placed by the law in the way of Irish trade and industry, and to repeal nearly all that remained of the penal laws against the Catholics, who now received the right of acting as counsel before the court, and of entering into marriages with Protestants. When further demands were refused, the Society of United Irishmen allowed its revolutionary aims to become more apparent, and the government then determined to quell the movement by force. The Habeas Corpus Act, which had been introduced into the country in 1782, was repealed; the towns were strongly garrisoned, and the society dissolved and disarmed.

But the conspirators, trusting to expected aid from France, were not discouraged. At the close of 1796 a considerable French fleet did actually appear off the Irish coast bearing 25,000 land troops, under the command of General Hoche; but owing to adverse winds, and the incompetence of the commanders, it was obliged to return without having accomplished anything. The only effect of this expedition was to induce the government to take still stronger measures in Ireland, the whole of which was placed under military law. The United Irishmen were thus prevented from taking any open steps for renewing the society, but they continued to pursue their ends in secret, and devised for themselves a very skillful military organization. At its head was a directory of five men, whose names were known only to those at the head of the provincial committees. In January, 1798, the society already numbered more than 500,000 members, when a treacherous member gave information regarding the society to the government, and several of the leaders were seized. In consequence of this the conspirators, not knowing the extent of the revelations that had been made, resolved to anticipate any further preventive measures on the part of the government, and rushed into premature action. In May, 1798, simultaneous risings took place at different parts of the island; but the government was fully prepared, and the main body of the insurgents suffered a decisive defeat at Vinegar Hill on June 21. Flying columns traversed the island, and checked by the most violent measures any further outbreaks. In August a French squadron appeared in Killala bay with 1,500 men on board, under General Humbert; but the British troops were easily able to prevent the troops after they had landed forming a junction with the insurgents, so that they were soon compelled to surrender. Another French expedition which approached the Irish coast in September was overtaken and attacked by Admiral Warren, and nearly all the ships composing it were captured. Several subsequent attempts of the French were similarly frustrated.

The events of this insurrection brought the British government to form the resolution of uniting the Irish and English Parliaments, since in the state of feeling which that movement too plainly manifested as prevailing among the people, it was felt that the independence of legislation enjoyed by the country fostered the desire of political independence, and it was feared that new revolutionary efforts might thence derive a legal sanction. The first proposal to this effect which was made in the Irish Parliament was rejected with indignation. The government then resorted to bribery to secure its purpose. The sum of £1,600,000 was spent in buying up the rotten boroughs which had the majority of seats in the Irish House of Commons. The Irish lords

were from the first more favorable to the project. By these means an act providing for the legislative union of the two countries passed the Irish Parliament on May 26, 1800, and the British Parliament on July 2 in the same year, in virtue of which the union was effected on Jan. 1, 1801. But though this measure bound the destinies of Ireland still more closely to those of the sister island, it was far from putting an end to the religious and political troubles which had so long divided the two countries. In order to gain the masses the enlightened Pitt had promised a complete political emancipation of the Catholics; but the bigoted George III. could not be induced to make this concession. Enraged at this breach of faith, the Irish Catholics in 1802 formed a Catholic Association having for its object the accomplishment of this end; but it was not till the period of O'Connell's agitation, favored by a change of public opinion in England, that the government was induced to bring in an Emancipation Bill, which, after passing both Houses of Parliament, received the assent of George IV. on April 13, 1829. A new oath, which could be taken by Catholics as well as Protestants, was substituted for the one previously required from members of Parliament, and Catholics were thus enabled to take a seat in the House. They were also allowed to fill all public offices except that of lord chancellor.

This victory was greeted by the Irish Catholics with great joy; but instead of satisfying them it only encouraged them to new demands. The efforts of the National party were now directed to the repeal of the Union, for which purpose O'Connell founded the Repeal Association, which caused the Grey ministry in 1833 to bring before Parliament the Irish Coercion Bill. When this bill became a law the lord lieutenant of Ireland was empowered to forbid all assemblies of the people, and to proclaim military law throughout the island; and in order to give force to the act an army of 36,000 men, besides 6,000 armed police, was sent over. The Coercion Act was indeed soon repealed, and from 1835, under the viceroyalty of Lord Mulgrave, a better feeling seemed to be growing up between the people and the government. But when the Tories came again into power in August, 1841, O'Connell began anew the repeal agitation, and with such boldness that in 1843 the authorities caused him to be apprehended on a charge of conspiracy and sedition, on which he was convicted and condemned to pay a fine and suffer imprisonment for a year. These proceedings were, however, declared illegal by the House of Lords, and O'Connell was released; yet they had the result of infusing a spirit of greater moderation into the agitators, and soon after the terrible famine which visited Ireland cast all other interests into the background. To mitigate this calamity the British Parliament granted enormous sums of money; but in spite of all that could be done thousands died from starvation, and the population, as above shown, was greatly decreased. Anarchical outbursts, agrarian murders, and other acts of violence distracted the land—the extremity of want had completely loosened the bands of the law.

In the midst of this crisis O'Connell died, and the place of the party which he led was taken by one still more advanced, which received the name of Young Ireland. In these circumstances of political excitement the French Revolution which took place in February, 1848, had a great effect upon Ireland. The leaders of the Young Ireland party, William Smith O'Brien, Mitchel, Duffy, Meagher, and others, entered into relations with the provisional government at Paris, and the people generally began openly to provide themselves with arms, and to exercise themselves in the use of them. But the measures of the government frustrated the designs of the conspirators. The Habeas Corpus Act was suspended, the insurrectionary newspapers suppressed, and O'Brien, who had been hailed by the people as King of Munster, after an unsuccessful attempt at insurrection, was taken prisoner, and along with his associates condemned to death. This punishment was afterward commuted to transportation. In a short time peace was restored; but the material distress remained undiminished. Famine and disease decimated the population. The agricultural holdings were deserted, whole districts remained uncultivated, and a constant and overflowing stream of emigration directed itself toward the United States. After this diminution of the population a general improvement gradually became visible among the remainder of the inhabitants. Agriculture revived, and the manufacturing industries of the island began to compete with those of England. In 1849 were chartered the Queen's Colleges, offering the same advantages to Catholics as to Protestants; but these institutions have been taken comparatively little advantage of by the former. In 1852 telegraphic communication was opened with Great Britain. In 1853 an industrial exhibition was held in Dublin, resembling that held two years before in London. Another exhibition was held in 1865.

The latter year witnessed the discovery of a new conspiracy designed to effect a separation between England and Ireland. This had its origin in America at the time of the Civil War in the United States, when the numerous Irish in that country hoped for a rupture between it and England, of which they might take advantage. This conspiracy, originating among the members

of a secret society calling themselves Fenians (*q. v.*), soon spread to Ireland; but before the Fenians could take any overt action in that island their design was stifled by the proceedings of the British government. The attention of the leading English statesmen was now strongly drawn to the necessity of doing all that could be done to render the Irish people loyal and contented; and with this view the act to disestablish the Irish Protestant Episcopal Church was passed in 1869, and another to improve the tenure of land, in 1870. Since 1870 an agitation for what is called Home Rule has made itself prominent. Its chief supporters, who are designated as "Nationalists," profess not to desire the severance of Ireland from Great Britain; what they mainly want, it would seem, is to have an Irish Parliament to deal with matters exclusively Irish. In 1879 Ireland became the scene of an agitation carried on mainly by a body calling themselves the Land League. The movement was marked by so much lawlessness that two special acts, a "coercion" act and a peace preservation act, were passed. The former (in force 1881-1882) gave extensive powers of imprisoning suspected persons, and many, including members of Parliament, were temporarily confined. Still further to redress Irish grievances a land act was also passed in August, 1881, the chief provisions of which have already been mentioned.

The Land League was suppressed, but a new body called the National League was soon organized in its place. On May 6, 1882, the newly appointed chief secretary, Lord Frederick Cavendish, and Thomas H. Burke, the under-secretary, were murdered in Phœnix park, Dublin. These murders led to the passing of a stringent act for the suppression of crime in Ireland, and it continued in force for three years. Another act for the relief of tenants in arrears with their rents was passed soon after. In 1885 eighty-six Nationalist members, headed by Charles S. Parnell, were returned to Parliament, and their pressure on the government led to the production of a scheme by W. E. Gladstone in 1886 by which Ireland was to receive a Parliament of her own and the Irish members were to be withdrawn from the Imperial Parliament. This and the accompanying land-purchase scheme were rejected by Parliament and the constituencies. Gladstone in 1893 introduced his second Home Rule bill, but though it passed the Commons, it was rejected by the Lords, and in 1907 a bill granting certain measures of Home Rule was introduced in the British Parliament by the chief secretary for Ireland, the Right Hon. Augustine Birrell. But an enormous convention assembled at once in Dublin under the leadership of John E. Redmond, representing all parties, who were unanimous in denouncing it, and the bill was dropped. In 1898 a Local Government (Ireland) Act was passed (see HOME RULE). On March 25, 1903, George Wyndham, chief secretary for Ireland, introduced in the House of Commons a new land bill to become effective on Nov. 1 following, which was accepted by the House of Lords on Aug. 14. The bill provided for the issue of about £100,000,000 in 2¾ per cent. government bonds with which to buy out the Irish landlords, the state being secured by a guarantee fund which consists of the various funds voted by Parliament for local purposes. Advances are made to the tenants to buy out their holdings under the supervision of the three estates courts. The holdings must be sold by estates, otherwise the bonus of 12½ per cent. on the purchase money will not be paid to the landlords. This bonus is estimated at £60,000,000 in addition to the price of their land, and is offered as an inducement to them to sell. Deficiencies in land purchases are made up out of the guarantee fund, which, it is estimated, will secure advances up to £152,000,000. The tenant-purchasers repay their advances by an annuity of 3½ per cent. on the purchase money of their holdings—2¾ per cent. for interest and ¾ per cent. for a sinking fund, the accumulation of which will repay the advance in 68½ years, when all obligation of principal and interest will have been discharged. Although the land stock is as safe as consols, it was first issued at a discount of over 12 per cent., but in 1906 £7,000,000 of land stock was issued and oversubscribed nine times the amount. The extent to which advantage has been taken of this act is indicated by the fact that, since its passage to 1906, there have been 5,300 applications for purchase of holdings representing £991,553, of which 4,468 were granted provisionally, involving advances of £826,220; 3,521 loans were issued, amounting to £685,318, which, with other advances made for congested districts, made the total cash loans £760,794. The estates commissioners made advances under this act to 1906 for 3,596 estates, the purchasers numbering 97,245. The purchase money amounted to £35,401,177; £125,436 was paid in cash, and the balance, £35,275,741, was in the form of advances.

Ireland, John, a Roman Catholic prelate; born in Ireland, Sept. 11, 1838; came to the United States early in life; was educated in the Cathedral School of St. Paul; studied theology in France and was ordained a priest Dec. 21, 1861; was chaplain of the 5th Minnesota Volunteers in the Civil War. After the war he became rector of the cathedral in St. Paul; in 1875 was made coadjutor to Bishop Grace, of St. Paul, whom he succeeded in 1884; and he became archbishop in 1888.

Irenæus (ī-ren-ē′us), a Church father;

born in Asia Minor, about 120; was a disciple of Polycarp, by whom he is said to have been sent to Gaul. On the martyrdom of Pothinus, he succeeded him in the bishopric of Lyons in 177. His great work is his refutation of the Valentinian form of the Gnostic heresy, and is usually named "Against Heresies." He died about 202.

Irene, a poor orphan girl of Athens; born about 752. Her beauty and talents excited the admiration of the Emperor Leo IV., who married her in 769. After the death of Leo in 780 she ruled as regent during the minority of her son, Constantine VI. Banished to Lesbos in 802, she died there the next year.

Ireton, Henry, an English soldier; born in Nottinghamshire in 1611. He graduated at Oxford and studied law at the Middle Temple, London, and on the breaking out of the Civil War offered his services to the Parliament. His connection with Cromwell, whose daughter Bridget he married in 1646, greatly advanced his interests. At Naseby he was taken prisoner by Rupert, but Cromwell's charge set him at liberty. Ireton was one of the most implacable enemies of the king, and signed the warrant for his execution. He accompanied Cromwell to Ireland, and in 1650 became lord deputy. He died in Limerick, Nov. 26, 1651.

Iridium (ī-rid′ē-um), a metallic element discovered by Tennant in 1804, in the black scales that remain when native platinum is dissolved in aqua regia. To separate iridium from other metals with which it is associated is a difficult process, the object of which is to obtain in the first place pure iridium chloride, or ammonium chloriridiate, from the former of which the metal may be obtained by reduction by hydrogen at a high temperature, and from the latter by simple ignition. When the latter process is resorted to, the residue, after ignition in a crucible, is reduced by hydrogen at a high temperature, and treated successively with water and concentrated hydrochloric acid, by which all impurities are removed, and the metallic iridium left in a finely divided state. Iridium is a white, brittle, very hard metal, fusible with great difficulty in the flame of the oxy-hydrogen blowpipe. It is insoluble in all acids, but when reduced by hydrogen at a red heat it oxidizes slowly and dissolves in nitro-hydrochloric acid. Iridium forms four oxides—IrO, Ir_2O_3, IrO_2, and IrO_3. The monoxide, or hypo-iridious oxide, IrO, is but little known. The sesquioxide, or iridious oxide, Ir_2O_3, is unstable, having a great tendency to absorb oxygen and become dioxide. The dioxide, or iridic oxide, IrO_2, is the most easily prepared and the most stable. It is prepared by boiling a solution of iridic chloride with an alkali. The trioxide, or periridic oxide, IrO_3, is unknown in the free state, but is found in combination with potash as a black crystalline powder, when iridium is fused with niter. Iridium forms four chlorides — IrCl, $IrCl_2$, Ir_2Cl_6, and $IrCl_4$ — but only two of them have been obtained in definite form — viz., the trichloride, or iridious chloride, Ir_2Cl_6, and the tetrachloride, or iridic chloride, $IrCl_4$. Iridious chloride combines with other metallic chlorides, forming compounds, called iridoso-chlorides, which are all olive-green pulverulent salts. Iridic chloride also unites with alkaline chlorides, forming iridio-chlorides, which are all of dark brown color. There are three iodides of iridium analogous to the chlorides, and three sulphides analogous to the first three oxides. Iridic solutions give, with ammonium or potassium chloride, a crystalline precipitate, which is distinguished from the platinum precipitate by its reddish-brown color.

Iris (ī′ris), in classical mythology, the messenger of the gods who carries messages from Ida to Olympus, or from the gods to men. In the Hesiodic "Theogony" she is a daughter of Thaumas and Electra, and a sister of the Harpies. According to later versions she was married to Zephyrus and became the mother of Eros. In the "Iliad" the rainbow also was called Iris, but the personification of Iris as the goddess of the rainbow seems to be of later growth.

IRIS.

In astronomy, an asteroid of the group between Mars and Jupiter, discovered by Hind in 1847.

In botany, the flower-de-luce, the typical genus of the order *Iridaceæ*. The species are very numerous, and are generally remarkable for their large, yellow, white, or blue flowers, and sword-like leaves. They abound in Europe, but are rare in America. The rhizomes of several species are more or less purgative and emetic. Those of *I. florentina, pallida,* and *germanica* possess a violet odor, and are used in perfumery for imparting an agreeable odor to the breath, and by the French especially for making issue peas. These rhizomes, dried and scraped, constitute the orris root of the shops. The roasted seeds of *I. pseudacora,* the yellow flag, have been recommended as a substitute

for coffee, but they do not appear to have any of the valuable properties of that beverage. The genus is so named on account of the variety of colors exhibited by it.

In anatomy, the anterior part of the choroid coat of the eye, with superadded muscular fibers.

In jewelry, the name given by French jewelers to limpid and transparent stones, but chiefly to rock crystal when reflecting prismatic colors like opal, by means of natural internal flaws. Common rock crystal is sometimes artificially converted into iris, but in these cases the fissures are produced in the outer part of the stone instead of being in the interior.

Iriscope (ī′ri-skōp), an instrument invented by Dr. Reade for exhibiting the prismatic colors. It consists of a plate of polished black glass, having its surface smeared with a solution of soap, and dried by wash leather. If the breath be directed through a tube upon the glass, the vapor will be deposited in colored rays.

Irish Church, or **Church of Ireland,** a popular name sometimes given, prior to 1871, to what was not an independent denomination, but was an integral part of the United Church of England and Ireland. It constituted the Established Church of the two countries. When on Jan. 1, 1871, the Act of Parliament disestablishing and disendowing the portion of the United Church which was in Ireland, took effect, those affected by the measure, rejecting the name proposed by the government for the new organization, adopted that of the Irish Church or the Church of Ireland. It comprehends within its pale about ⅛ of the Irish people. The Irish Church Act made provision for compensating vested interests, the total number of persons commuted being 6,162.

Irish Moss. See CARRAGEEN.

Irish Presbyterian Church, a Presbyterian Church, formerly called the Synod of Ulster, as having its strength mainly within that province of Ireland. Its members are mostly descended from the Scotch Presbyterians, who came over by invitation of James I., between 1609 and 1612, to colonize Ulster. The church still remains identical in doctrine with the Scotch Establishment.

Irish Sea, a body of water lying between the N. of Ireland and the N. of England, with the S. W. counties of Scotland on the N. It is connected with the Atlantic on the N. W. by the North Channel and on the S. by St. George's Channel. Between the coasts of Louth (Ireland) and Lancaster the Irish Sea has a width of 150 miles; its greatest length N. and S. is about the same. Within its boundaries lie the Isle of Man and Anglesey, with Holyhead Island.

Irish Sisters of Charity. See SISTERHOODS.

Irish Society, a committee of citizens belonging to 12 London Companies, invited by James I. in 1613 to take part in cultivating the confiscated lands in Ulster, which, to the extent of 511,465 acres, had become vested in the crown. The society in large measure built Londonderry, though walls and bastions had been erected there as early as 1609. They largely colonized the county of the same name, which was bestowed in honor of the 12 London companies. The full title of the society is the Honorable Irish Society.

Iritis, or **Iriditis** (ī-rī′tis, ī-rid-ī′tis), an inflammation of the iris, accompanied by vascularity, change in color and appearance, irregularity and immobility of the pupil, with a visible and varying amount of lymph deposited in, on, and round the iris.

Irkut (ēr′köt), a river of Siberia, in the district of Irkutsk, rising in the mountains of Sayansk, near the frontiers of China, and after a course of 220 miles flows into the Angara at the town of Irkutsk.

Irkutsk (ēr′kötsk), a government of Eastern Siberia, separated from China on the S. by the Sayan Mountains, from Transbaikalia on the E. by Lake Baikal, and bounded W. by Yeniseisk, and N. and N. E. by Yakutsk, occupies an area of 287,061 square miles. The country is generally mountainous, but produces rye, barley, oats, and vegetables. The most important river is the Angara or Upper Tunguzka (1,000 miles), which connects Lake Baikal with the river Yenisei. The Lena and its tributary the Vitim are the rivers that come next in size. Gold, iron, and salt figure foremost among the mineral products. Agriculture, cattle breeding, and the transport of goods to and from China are the chief occupations of the people. Pop. (1897) 506,517, consisting of Buriats, Tungus, and Russians (⅓ exiles and forced colonists). The industries are not much developed, consisting chiefly of brandy distilleries, with iron foundries and factories for salt, cloth, and pottery. The towns are Irkutsk, Kirensk on the Lena, Nijniudinsk, and Verkholensk.

Irkutsk, the capital, on the Angara, is the residence of the governor-general of Eastern Siberia and the seat of a bishop. Though 3,722 miles from St. Petersburg (and 40 from Lake Baikal), Irkutsk is the best built town in Siberia, with straight, wide streets and handsome public buildings. It possesses a cathedral, several churches, a public library, a museum of natural history, and other public institutions. Pop. (1897) 51,484, mostly Russians and Buriats. Irkutsk was founded by a Cossack chief, Ivan Pochabof, in 1652, and obtained town rights in 1686. Owing to its position on the great Siberian highway between China and Russia, it is the commercial center of Siberia, espec-

ially for the tea trade; the annual value of its trade amounts to about $7,000,000. The Angara constitutes the main highway for goods bound for Kiachta across Lake Baikal, as well as for those coming from Eastern Siberia and China for Russia. The communications between Irkutsk and Yakutsk and the N. parts of Siberia are carried on by the river Lena. A destructive fire occurred in 1879, doing damage to the extent of $10,000,000.

Irmin (er'men), a god of the ancient Germanic tribes, the Hermiones and the Hermunduses. To him were dedicated the so-called Irmin or Irmen Pillars, one of which originally stood at Marsberg in Westphalia, but was destroyed by Charlemagne in 772. These pillars were mostly made of wood, and probably were crowned with an image of the god. They were held in great veneration by the people. "Irmin's chariot" was a name given to the constellation of the Great Bear.

Iron, in chemistry, ferrum, a metallic tetrad element, symbol Fe, at. wt. 56, sp. gr. of pure iron 7.8. Iron occurs nearly pure or alloyed with nickel in meteorites, but is generally found in combination with oxygen and as a carbonate. It is widely diffused in rocks, and often forms the chief coloring matter of clays and sands. It also occurs combined with sulphur. The chief ores used for the manufacture of iron are magnetite, hæmatite, brown oxide, spathic ore and clay ironstone. The ore is first calcined, to expel the water and carbonic acid and most of the sulphur, and to convert the oxides to peroxide, which prevents the waste of iron in the form of slag. The calcined ore is then smelted, with the addition of coke and limestone; the limestone unites with the silica present and forms a fusible slag, while the oxide of iron is reduced by the action of the carbon monoxide. The iron thus obtained is called cast or pig iron, and is very impure. Pure iron is prepared by placing four parts of fine iron wire, cut in pieces, and one part of black oxide of iron in a Hessian crucible, and covering it with a mixture of white sand, lime, and potassium carbonate in the proportions used for glass-making; a cover is then closely applied and the crucible exposed to a very high temperature. Iron is a soft, tough, tenacious, malleable, ductile, white metal, not acted upon by dry air; but it rusts in moist air containing carbonic acid, forming a hydrate of the sesquioxide. When heated to redness in the air, it is coated with black magnetic oxide, Fe_3O_4. It burns in oxygen gas, black oxide being formed. Red-hot iron decomposes water, hydrogen being given off. Iron is magnetic; it is soluble in dilute hydrochloric acid and in dilute sulphuric acid with evolution of hydrogen. Iron unites with oxygen, forming ferrous oxide FeO and ferric oxide Fe_2O_3. Intermediate oxides are also known. The alchemists represented it by the symbol of Mars. Iron is widely diffused through rocks. Many are colored red by its oxides. It is also deposited from ferruginous springs.

Iron is mentioned in the Bible as early as Gen. iv: 22. Tubal Cain is described as having been an "instructor of every artificer in brass (copper) and iron." On the sepulchers of the Egyptian Thebes, butchers are depicted as sharpening their knives on a round bar of metal which, from being blue, is assumed to be iron. The steel weapons in the times of Rameses III. are also painted blue. There are with them the representations of bronze weapons, which are painted red. Iron ore is said to have been discovered in Mount Ida about 1406 B. C. The Romans early knew it. There is so much iron ore in India that it must have been known from remote times. Iron mines came into operation in Britain 54 B. C. The exportation of iron was prohibited by the British government in 1354, and in 1483 the importation of such manufactured iron goods as could be made at home was forbidden. In 1713 Darby introduced the general use of coal instead of wood as fuel, a process which had been practised by Lord Dudley in 1619. In 1783 Cort obtained a patent for rolling, and in 1784 for puddling iron. The hot blast was discovered by Dalton in 1827, and the Bessemer process for converting crude iron into manufactured iron and steel in 1856.

Native iron is found in masses or smaller portions in meteorites. It is nearly pure, still it contains 1 to 20 per cent. of nickel with traces of cobalt, manganese, tin, copper, chromium, phosphorus, etc. Whether unmeteoric native iron exists is doubtful. Specimens of ore so pure as to admit of direct forging into horseshoes have been mined at Shepherd's Mountain, in the Iron Mountain district of Missouri.

The commanding position of the United States in the production and manufacture of iron and steel is illustrated by some figures published in the London "Commercial Intelligence." The world's total product of pig iron in 1901 amounted to 40,408,000 tons, of which the United States contributed 15,878,000 tons; the United Kingdom, 7,760,000 tons; Germany, 7,663,000 tons; Russia, 3,100,000 tons; France, 2,362,000 tons; and the remainder of the world, 3,665,000 tons. Comparing the product of 1901 with that of the annual average for the five-year period of 1866–1870, it will be seen that the United States increased its iron and steel output far more rapidly than any other nation, the figures being: United States, from 1,464,000 tons to 15,878,000 tons, an increase of 985 per cent.; United Kingdom, from 5,133,000 tons

to 7,750,000 tons, an increase of 51 per cent.; Germany, from 1,226,000 tons to 7,663,000 tons, an increase of 525 per cent.; and the entire world, exclusive of the countries mentioned, from 2,710,000 tons to 9,117,000 tons, an increase of 236 per cent.

An even more noticeable feature of the growth is the steady and enormous growth of the proportion of the world's product supplied by the United States, and the equally rapid decadence in the position held by Great Britain. Thirty-five years ago the United Kingdom produced practically one-half of the world's pig iron, while the United States produced less than one-seventh of the total; whereas, in 1901 the United States stood first in its proportion of the total, contributing practically four-tenths, as against less than two-tenths by the United Kingdom, and about the same share by Germany.

In the five-year period, 1866 to 1870, the world's per capita consumption of pig iron was 17 pounds; in 1901 it was 57 pounds; while in the latter year the United States consumed 455 pounds per capita, and the United Kingdom 350 pounds per capita.

The effect of this remarkable increase in the production of iron in the United States has been strongly marked in its relation to the foreign commerce of the country. Imports of iron and steel manufactures in 1882 amounted to $67,976,897 and formed 9.3 per cent. of the total imports; in 1901 they had fallen to $17,874,789 and formed but 2.2 per cent. of the total imports. On the other hand, the exports of iron and steel manufactures grew during the same time from $20,748,206 in 1882 to $117,319,320 in 1901. They formed in 1882 about 3 per cent. of the total exports, and 15 per cent. of the manufactures exported; in 1901 they formed 8 per cent. of the total exports and 28 per cent. of the manufactures exported.

The following table shows the production of pig iron in the United States, the United Kingdom, Germany, and all other countries at specified periods from 1865 to 1908, stated in metric tons:

Year	United States	United Kingdom	Germany	All other countries
1865...	831,770	4,819,300	759,700	2,839,300
1870...	1,665,179	5,963,515	1,369,139	2,902,200
1875...	2,023,733	6,365,462	1,997,317	3,509,736
1880...	3,835,191	7,749,233	2,685,909	3,201,248
1885...	4,044,526	7,415,469	3,629,158	4,439,221
1890...	9,202,703	7,904,214	4,584,835	5,737,993
1895...	9,446,308	7,703,459	5,379,041	6,375,800
1900...	13,789,242	8,959,691	8,385,885	9,265,200
1908...	16,190,944	9,438,477	11,813,511	10,828,623

The following table shows the production of iron ore in the United States in 1908 by districts and varieties in long tons:

State	Hematite	Brown ore	Magnetite	Carbonate	Total quantity	Total value
Minnesota	18,652,220	.....	.....	.....	18,652,220	$42,313,974
Michigan	8,839,199	.....	.....	.....	8,839,199	25,150,861
Alabama	2,775,903	958,535	.....	.....	3,734,438	4,358,902
Wisconsin	730,743	3,250	.....	.....	733,993	2,027,208
New York	33,825	.....	663,648	.....	697,473	2,098,247
Virginia	64,323	626,910	990	.....	692,223	1,465,691
Tennessee	226,038	409,305	.....	.....	635,343	876,007
Montana, Nevada, New Mexico, Utah, Washington, and Wyoming	354,012	68,565	95,872	.....	518,449	708,760
Pennsylvania	26,162	73,001	343,998	.....	443,161	572,346
New Jersey	.....	(c)	c394,767	.....	394,767	1,162,474
Georgia	1,248	319,812	.....	.....	321,060	540,189
Missouri and Iowa	77,400	21,014	.....	.....	98,414	218,182
Texas	.....	55,966	.....	.....	55,966	30,663
Kentucky, Maryland, and West Virginia	7,491	45,744	.....	.....	53,235	84,898
North Carolina	.....	.....	48,522	.....	48,522	76,877
Connecticut and Massachusetts	.....	28,112	.....	.....	28,112	105,457
Ohio	.....	.....	.....	26,585	26,585	36,736
Colorado	.....	10,176	.....	.....	10,176	18,432
Totals	31,788,564	2,620,390	1,547,797	26,585	35,983,336	$81,845,904

c Brown ore and magnetite. The total production in 1907 was 51,720,619 long tons, valued at the mines at $131,996,147.

Iron Age, in classical mythology, the last of the four great ages of the world described by Hesiod, Ovid, etc. It was supposed to be characterized by abounding oppresssion, vice, and misery.

In scientific archæology, an age, the third in succession, in which weapons and many other implements began to be made of iron, stone having been used for these purposes in the first, and bronze in the second. As the advancement of each tribe or people is not necessarily at the same rate as that of their neighbors, the Iron Age probably did not begin everywhere simultaneously. In Denmark and adjacent regions it may have commenced about the Christian era.

Iron Bark Tree, a name given in Australia to certain species of eucalyptus, and particularly *E. resinifera,* or red gum, on account of the extreme hardness of the bark.

Iron City, a popular name applied to Pittsburg, Pa., because of the large number of its furnaces, rolling mills, and foundries; also known as the "Smoky City," because of the large use of bituminous coal.

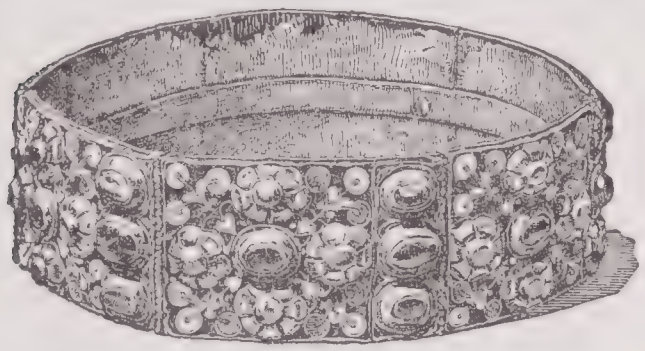
Ironclad, a naval vessel protected by iron plates. The system of plating ships with iron was first tried on some of the French floating batteries used at Kinburn in 1855; but, though the results were satisfactory, no advance was made till 1858, when the French again took the lead with the "Gloire," but were quickly followed by the first English armored vessels of the "Warrior" class, to which were added, to strengthen the ironclad fleet, altered wooden line-of-battle ships, such as the "Royal Alfred," which were cut down and plated. All the early vessels were constructed of wood, but the later specimens have been built of iron framing, and few of the modern ships are alike. The first crucial test to which ironclad vessels were subjected, however, was reserved for the American navy to apply. An old wooden steam vessel, the "Merrimac," was razed by the Confederates, and covered with iron (railroad rails, etc.), the sides sloping up to an apex like the acute angle formed by an old-time house roof. In addition to the iron plating thus applied, the ship was armed with a spur or point for the purpose of ramming the enemy's ships. Operations were begun against the Federal war vessels in Hampton Roads, Virginia, in the early part of 1862, and as a result several of them were either sunk, battered, or run aground in their endeavors to escape from the formidable foe. After the "Cumberland" and "Congress" had been irretrievably injured, and the "Minnesota" run aground, the "Monitor," the first turreted ironclad ever used in active warfare, the production of Capt. John Ericsson, appeared in the roadstead, and then began the first naval duel between ironclad vessels. Neither the "Virginia," as the "Merrimac" had been rechristened, nor the "Monitor" was much injured in the fight, but owing to the less draught of the "Monitor" the Confederate vessel was rendered practically useless and obsolete, and in a few days thereafter was run down the James river to Craney Island and sunk by Lieut. Charles H. Hasker, an English naval officer who had emigrated to the United States and joined the Confederate service. The "Virginia" was commanded by Capt. Frank Buchanan, while Lieut. John L. Worden commanded the "Monitor." During the engagement between the two vessels Lieutenant Worden was seriously injured by fragments of a projectile which struck a grating through which he was looking, the flakes of iron flying into his face and blinding him. The success of the "Monitor" gave rise to numerous vessels of the same type, the salient features of which were a low free board and a revolving turret, and practically revolutionized naval warfare. After honorable service the "Monitor" foundered off the North Carolina coast, along which she was being towed to one of the S. ports. The "Warrior" had 4½-inch iron plates tapering off to 3 inches toward bow and stern, but her steering gear was unprotected, and she had a projecting bow. The next pattern was protected throughout with armor of the same thickness, which covered the steering gear, and in these models the bow was made vertical or inclining inward. At first the plates were bolted on teak, with a thin inner skin of iron, but later on this was strengthened by angle iron, and the plates have been steeled. The thickness ranges from 4½ inches, with the "Warrior" class, tapering to 3 inches at stem and stern, to about 3 feet with the Italian "Duilio." The next change was to thicken the belt along the water line, and in front of a central gun battery, the ends of which were also armored and pierced on the upper deck to fire fore and aft. In other cases the guns were held in turrets, either movable or fixed, on each side of the central line of the ship. In most instances the guns fire through port holes in the battery, but in others they fire over it *en barbette.* A few ships have been constructed as seagoing vessels without masts or sails, their armor being 16 to 18 inches thick, and others represent the simple coast defense type. There has been a tendency to reduce the number and increase the size of the guns carried, and to confine them in a central battery, while the ship is protected by a belt of armor along the water line, above which is an iron plated deck some inches thick. The ironclads of the United States navy are varied in type, most of them being armored cruisers of extreme speed, and depending more upon celerity of movement than on heavy armor or armament. The French began with 4½ inches of armor, gradually increasing the thickness to 22 inches with the "Amiral Duperré"; but the classes of war ships continually vary. Germany has gunboats of the "Wespe" class, carrying one gun firing over a shield in the bows, but otherwise thinly plated; corvettes of the "Hansa" class, and frigates like the "Kaiser" with 10-inch armor. Russia's ironclads are not remarkable, except the circular "Popoffs," which, armored all round and flat-bottomed, are barely seaworthy. Italy has taken the lead in ships of the "Italia" type, which are low free-

board vessels with turrets plated with 36 inches of iron, and a deck plate 2½ inches thick. See DREADNAUGHTS.

Ironclad Oath. See TEST OATH.

Iron Cross, a Prussian order, instituted March 10, 1813, by Frederick William III., to be conferred for distinguished services in war. It was made of iron to commemorate the grim "iron" period at which it was created. The decoration consists of a Maltese cross of iron, edged with silver, and is worn round the neck or at the buttonhole. The order was revived by William I. in 1870, on the eve of the great war with France. The grand cross, a cross of double the size, is presented exclusively for the gaining of a decisive battle or the capture or brave defense of a fortress.

Iron Crown, a golden crown, set with precious stones, with which anciently the kings of Italy, and afterward the German



IRON CROWN OF LOMBARDY.

emperors, were crowned when they assumed the character of kings of Lombardy. It has received the above name from an iron circle, forged, according to a tradition opposed by some and accepted by others, from a nail of the cross of Christ, and introduced into the interior of it. It was worn, we are told, by Agiluph, 591; and by Charlemagne as King of Italy; by Henry of Luxemburg, 1311; by Frederick IV., 1452; by Charles V., 1530; and by Napoleon I., 1805. Later it was taken by the Austrians to Vienna; but in 1866 it was given up to Victor Emmanuel on the conclusion of the peace with Austria. Napoleon I., after his coronation, established the Order of the Iron Crown. When the Emperor of Austria in 1816 took possession of the Lombardo-Venetian kingdom he admitted the Order of the Iron Crown among the Austrian orders.

Irondale, a locality in Jefferson Co., Wash.; 5 miles S. of Port Townsend. Here, nearly one-quarter of a century ago, was erected the first blast furnace on the Pacific coast. The venture, after being in operation for a matter of 12 years, proved a failure, and the plant was shut down. After the expenditure of $250,000 in prospecting and developing iron mines, experimental work with fuels, the installation of new machinery, and the repair of the old plant, the Pacific Steel Company, a corporation in which practical ironmakers of Pennsylvania are the principal owners, has commenced work where the defunct Puget Sound Iron Company abandoned it 12 years ago.

It is a fact that practically every pound of iron and steel which the Pacific coast consumes or sends over sea to foreign markets is brought from points E. of the Mississippi river; and it is claimed that competition with the iron works of the East is all but impossible, on account of the necessarily prohibitive freight rates on the raw materials. A short time ago the vice-president of the Pacific Coast Steel Company commenced an investigation of the iron mines on Texada Island, British Columbia, from which the ore used in the abandoned plant had been brought, and also thoroughly examined the coke and charcoal made on Puget Sound. Many tons of various Pacific Coast coals were sent to McKeesport, Pa., and there coked side by side with Pennsylvania coals and the results compared. As a result of these investigations, Vice-President Swaney purchased the abandoned plant of the Puget Sound Iron Company, and work was opened up once more at Irondale. The furnace was relined, the machinery for crushing and hoisting ore was overhauled, and the steam plant improved with a view to securing more economical power production, this refitting being carried out under the direction of the Wellman-Seaver Engineering Company, of Cleveland, O.

The blast furnace is 50 feet in height, 12 feet in the bosh, 6 feet on the crucible, and has a capacity of 50 tons of iron per day. A battery of four steam boilers furnishes power to drive the ore-crushing and hoisting machinery and the blowers. The gases are conducted from the top of the furnace by a large pipe and are led into the boiler house, where they are burned under the boilers in the manner customary in Eastern plants. Hot blast is used, the air entering the furnace through five tuyeres at a temperature of from 900° to 1,000°. The water for the supply of the furnace and steam plant is led by a wooden flume from Chimacum creek, the flume being 3½ miles in length.

The Irondale blast furnace makes use of the same grade of ore that was used when the plant was first in operation. This ore is brought on scows from Texada Island, British Columbia, which is 130 miles distant, and the Texada ore will be used till the value of the company's own mines has been determined. Moreover, the coke is brought on scows from the Skagit Coal and Coke Company's ovens. Other cokes from Pierce county and British Columbia will be tested experimentally. After the experimental work with coke is completed, it is

the intention to run the Irondale furnace entirely on charcoal, and hence a great deal of attention has been given to the charcoal-making plant.

The charcoal-burning kilns, which were built at a cost of $40,000, are 20 in number. They stand in a double row just E. of the main building. They are built of brick, bound with iron bands, and covered with concrete. Each kiln is 30 feet high and 30 feet in diameter at the base, and will hold 75 cords of wood. Originally the kilns were filled by hand, but appliances have been erected to automatically feed the kilns with wood, ready for burning, at a cost of 54 cents a cord. The log "culls" and "seconds" unsuitable for sawing into lumber are purchased of the large logging companies on the Sound, towed to the furnace, and placed in a boom in front of the charcoal kilns. The logs are then towed to a logway by a workman, and from that time till it is taken from the kiln as charcoal there is no handling of the wood. It is considered that a very promising feature, judged from the standpoint of economy, at this plant, is the cheapness of water transportation and the short distance over which the ores and fuel will have to be brought to the blast furnace. The kilns of the former company will be used, but a large sum has been expended in improvements and the new company expects to produce fuel at a lower cost.

Though the plant is not a large one, it is large enough to afford a thorough test of the problems of economical iron-making on the Pacific Coast. Should it prove successful and lead to the development of this most important industry on a large scale, it will prove to be an important factor in the development of the Pacific Coast.

Iron Founding. See FOUNDING.

Iron Gate of France, a name for the town of Longwy, a fortress of France on the Belgian frontier. Louis XIV. gave it the name.

Iron Hand, The. See BERLICHINGEN, GŒTZ VON.

Iron Mask, Man in the, a mysterious French prisoner, confined in the Bastille and other prisons in the reign of Louis XIV. The first notice of him was given in a work entitled "Secret Memoirs to Supply Material for a History of Persia." According to this writer he was the Duke of Vermandois, a natural son of Louis XIV. and De la Vallière, who, having given a box on the ear to his half brother, the grand dauphin, had to expiate it with imprisonment for life. The assertion was without foundation, for the Duke of Vermandois died in camp in 1683; but the confidence with which it was made caused a deep sensation, and the romance of Mouhy, "The Man in the Iron Mask," which immediately followed, was read with all the more avidity that it was prohibited. Another version makes Matthioli, minister to one of the petty Italian kingdoms, the famous prisoner. Voltaire, in his "Age of Louis XIV.," treats the anecdote historically, and apparently favors the opinion that the Mask was a twin brother of Louis XIV., confined to prevent possible state complications. The prisoner, in journeying from one prison to another, wore a mask, and was at last transferred to the Bastille, where he was treated with great distinction.

Iron Mountain, a city and county-seat of Dickinson co., Mich.; on the Chicago and Northwestern, and the Chicago, Milwaukee, and St. Paul railroads; 50 miles N. W. of Escanaba. It derives excellent water power from the Menominee river; is the trade center for miners of Dickinson county and the adjoining farming section in Wisconsin; and is almost wholly engaged in iron mining, in which industry $2,000,000 capital is invested and 1,000,000 tons of ore are produced annually. The city has several daily, weekly, and monthly periodicals, and a National bank. Pop. (1890) 8,599; (1910) 9,216.

Irons, shackles, fetters, or bilboes for the feet, especially such as are used on board ship.

Ironsides, a name popularly applied to the regiment of a thousand horse which Cromwell raised mainly in the E. counties for service against the king early in the great Civil War. The name, already given for his bravery to an English king, Edmund, was first attached to Cromwell himself, but passed to the men at whose head he first appeared at Edgehill.

Iron Stone, a "stone" or mineral into the composition of which iron largely enters.

Ironstone China, one of the contributions of Wedgwood to the ceramic art. The materials of the Staffordshire (English) ware are calcined flints and clay. The flints are burned in kilns, and then, while hot, plunged into water, by which they are cracked through their whole substance. They are then ground with water, in mills resembling the arrastra, to the consistence of cream. The clay, from Dorsetshire and Devonshire, is mixed with water, and in this state, as well as the flint, is passed through fine sieves to separate the grosser particles. The flint and clay are now mixed by measure, and the mixture is passed again through a sieve for better incorporation. In this state it is called "slip," is evaporated to a proper consistence, and tempered in the pug mill. Cups, pots, basins, and other round articles are turned rough on the

horizontal potter's wheel, and when half dried are again turned in a lathe. They are then fully dried in a stove, and polished up with coarse paper.

Ironton, a city and county-seat of Lawrence co., O.; on the Ohio river, and the Cincinnati, Hamilton, and Dayton, the Chesapeake and Ohio, and the Norfolk and Western railroads; 127 miles S. of Columbus. It contains a Memorial Hall, Masonic and Odd Fellow's Halls, city hospital, Briggs Public Library, Kelley and Riverview Parks, electric street railroad and lighting plants, Holly system of waterworks, 3 National banks, and manufactories of fire brick, iron and steel, nails, and other commodities. The city is the mining, manufacturing, and farming trade center for a region within a radius of 30 miles, and is at the base of a range of lofty hills containing large deposits of iron ore and bituminous coal. The city has an assessed property valuation of nearly $4,000,000. Pop. (1900) 11,868; (1910) 13,147.

Ironwood, a name given to various trees from the quality of their timber. The ironwood or hop-hornbeam of America (*Ostrya virginica*), order *Cupuliferæ*, is a tree with a trunk not exceeding six inches in diameter, with very hard wood, so heavy that it sinks in water, and foliage resembling that of birch. The species of the genus *Sideroxylon*, known as ironwood, are natives of the tropics and also of New Zealand, the Cape, etc. The *S. inerme*, or smooth ironwood of the Cape, has long been cultivated in the greenhouses of Europe. *Diospyros Ebenum* (the ebony) is also named iron wood, as is the *Metrosideros vera* of Java.

Ironwood, a city in Gogebic co., Mich., on the Chicago and Northwestern and the Wisconsin Central railroads; 39 miles E. of Ashland, Wis. It is the trade center for the famous Gogebic iron region, having an aggregate mining and lumbering population of over 20,000, and an annual trade of $2,500,000. Here is the Norrie Mine, said to be the largest producer of iron ore in the world, and there are also six other large mines. These, with the lumbering industry, employ nearly 3,000 people, and have an annual production valued at about $6,000,000. The city has a National bank, trolley line connecting with Hurley and Gile, Wis., weekly newspapers, and a property valuation of $7,000,000. Pop. (1890) 7,745; (1900) 9,705; (1910) 12,821.

Irony, a kind of ridicule which exposes errors or faults by seeming to approve, adopt, or defend them. Irony, as defined by Aristotle, is an artful representation of qualities or things as less than they really are. Thus, among the various characters of the human mind as given by him, the "*eiron*" is one who affectedly conceals or depreciates his own good qualities. Quintilian gives to rhetorical irony a far more general sense, terming it diversiloquium, or the use of expressions contrary to the thoughts of the speaker. He also distinguishes it into two species, treating it as a trope or figure of speech where the opposition of thought to language extends only to a few words; a figure of thought, where it extends to a whole passage or discourse. The Socratic irony is employed in argument when one speaker affects to take the positions of the other for granted, in order adroitly to lead him into self-contradiction or obvious absurdity. In the ordinary sense irony is a more delicate species of sarcasm, by which praises are bestowed where it is intended to convey the opposite sense of disapprobation; or assent is notified where the real object is to express dissent.

Iroquois (ir′ō-kwois), a confederation of Indians formerly occupying the W. and central portion of New York State, consisting at first of five tribes, the Oneidas, Mohawks, Cayugas, Senecas, and Onondagas. In 1712 the Tuscaroras were admitted to the league, which adopted the title of the "Six Nations," and is so known to history. The Iroquois were at once the most powerful and the most enlightened; they lived in villages and pursued agriculture. In the Revolutionary War they were allies of the English, but in 1779 they were attacked by General Sullivan and greatly injured. The Iroquois present the curious anomaly among Indian peoples of steadily increasing in numbers since 1812. Most of them have been removed to various reservations farther W.

Irradiation, a curious phenomenon in virtue of which a star or any bright object appears larger than it really is. If a thin platinum wire be intensely heated by the passage of an electric current, it seems to a person distant about 50 feet to be as thick as a pencil. In this way the sun's diameter looks larger than it is in the sky.

Irrational, in mathematics any quantity which cannot be exactly expressed by an integral number or by a vulgar fraction: thus $\sqrt{2}$ is an irrational quantity, because we cannot write for it either an integral number or a vulgar fraction; we may, however, approximate to it as closely as may be desired. In general, every indicated root of an imperfect power of the degree indicated is irrational. Such quantities are often called surds.

Irrawaddy. See IRAWADI.

Irredentist, in Italian politics, one of the party of the Left, in whose accession to office in 1876 the cry of "Italia Irredenta,"

A CALIFORNIA IRRIGATION CANAL

Irrigation

and pledges in favor of the recovery of the unredeemed territory, were powerful factors. Unredeemed Italy was held to include Trieste and the Trentino, in the occupation of Austria; the canton of Ticino, in Switzerland; and Nice and Malta, in the respective possession of France and England. The taking office by the Left was viewed with alarm in many countries, especially in Austria, where the precautionary measure was taken of strengthening and garrisoning the fortresses on the Italian frontier. The movement, however, had no solid foundation in the feeling of the Italian people.

Irrigation, the process of watering or moistening land by ditches or other artificial means. It is probably the earliest application of science to agriculture. During the last half of the 19th century the lands watered from the ancient irrigation works of India were more than trebled by the completion of the Ganges canal system, the largest and costliest in the world, and by the more systematic and effective operation of works previously built. The land reclaimed and the value of the products of irrigation in the historic Nile valley have

IRRIGATION BY FURROWS.
(The Usual Method.)

been largely augmented since 1870, and the completion in 1902 of the great dam at Assuan, which was built at a cost of $24,000,000, at once served to raise the agriculture of Egypt to an importance and prosperity never before known and till recently believed to be impossible. Since the construction of the first ditches in Utah by the Mormon pioneers, irrigation has marvelously extended the domain of enterprise and civilization in all parts of the world. It has wholly changed the appearance and prospects of the W. third of the United States. It promises likewise to make the W. Provinces of Canada one of the grain fields of the British empire. The irrigated farms of the Australian provinces of Victoria and New South Wales already rival and will in time surpass in value the livestock industries which were first established on the arid plains of that continent. From the last quarter of the 19th century irrigation has made the Hawaiian Islands one of the chief sources of supply for the sugar consumed in the United States. It has increased the population and agricultural wealth of New Zealand and been greatly extended in Mexico and Central America. This recent world-wide extension of irrigation in lands hitherto uninhabited and unproductive has added many millions of acres to the world's productive area, and is causing the commercial and social importance of this art or science to be appreciated as never before. That it is to be one of the great factors in the industrial development of the 20th century cannot be doubted, and this is causing both its methods and institutions to be studied as never before.

Methods.— The water used on the greater part of the irrigated area is distributed by gravity. The supply is tapped at a point higher than the land to be watered; thence it is carried in canals or ditches, which follow the contour of the country, to the place of use. Many of these canals are important engineering achievements. The Cavour Canal, in Italy, cost over $17,000,000, and it doubled the population of the valley of the Po in less than 50 years. The Ganges Canal is the greatest system in India. The upper Ganges has 890 miles of main channel, 3,700 miles of laterals, 282 miles of outlet channels, 31 locks, 202 bridges, and 17 dams. It was completed in 1884, irrigates 1,205,000 acres, and cost $14,644,000. The lower Ganges system embraces 531 miles of main canal and 1,854 of lateral canals. It irrigates 620,000 acres, and cost $7,000,000. The W. Jumna Canal, begun in 1875, has cost over $8,000,000, and has a total length of 1,200 miles. In the United States there are several canal systems which have cost over $1,000,000, and at Lagrange, California, is the highest overfall dam in the world. Of other systems of supply the village tanks in India are the most interesting. They are found by the thousands and scores of thousands in every province of British India. The lifting of water from wells or streams by hand or by oxen was one of the great means of ancient irrigation. Of recent years this has been supplemented by an important use of steam-pumping plants. There are 1,500 of these in the San Joaquin valley of California alone. A large part of the water used in the irrigation of cane in the Hawaiian Islands is raised by pumps. Some of these are of extraordinary size and capacity, being capable of lifting

Irrigation

20,000,000 gallons 500 feet vertically in 25 hours. The method of distributing water from canals must vary according to the amount of water available, the nature of the soil, the topography of its surface, and the character of the crop, and there can be no single best method under all circumstances. The experience of irrigators in the United States has led to the adoption of few methods, the one which most nearly conforms to the particular conditions of each situation being chosen, and the irrigator has to judge in determining this what considerations are of controlling importance and those which can be entirely disregarded.

Flooding.— Under the flooding system small parallel ditches are constructed about 100 feet apart, the plans varying with the slope of the ground. These small ditches are usually fed from a lateral from the main canal. Where the surface is broken, they will be irregular in outline, and will generally approximate a right angle to the steepest slope of the soil. They are usually simply furrows made with a heavy moldboard plow, and where the crop is grain they are filled back by the plow before harvesting. In the distribution of water they are cut at convenient points to allow the water to run out and spread over the surface. The water thus released if left alone would follow the lines of quickest descent, and in doing so spread out as it proceeds, dividing into numerous branches or rills as it increases its distance from the opening in the ditch. For the purpose of facilitating its spreading and to insure its application to every portion of the surface, the irrigator follows its course and guides it by moving a few shovelfuls of earth here and there, thus separating the various small rills and starting the branches in different directions. This is a cheap but somewhat disagreeable method, because the irrigator has to work in the water and use all his strength and speed in order to direct the water so that it will reach all points, which it seldom does in equal volume. It has for its chief claim cheapness and speed, but sacrifices economy. Under this system an experienced irrigator can cover from 10 to 20 acres a day, the area depending on the character of the land, the uniformity of the surface and the volume of water at his disposal. For such crops as grain, alfalfa, clover, and the various grasses, and for everything which is sown broadcast and is distributed uniformly over the surface, the flooding system is employed.

Checks.— A modification, and in some respects a great improvement, of irrigation by flooding consists in the use of what are called compartments or checks. It is really flooding by the use of levees, which restrict the movement of the water to definite areas, thus giving assurance that it shall remain on this area till it sinks out of sight or is drawn off. The compartments or squares vary in size according to the slope of the ground and with the locality. The Mexican irrigators in the S. W. make compartments less than 100 feet square, while in California and Arizona they often contain several acres. Improvements in this system have been made till at present the levees are quickly, evenly and strongly made by the use of special tools and methods. It has become, in fact, a model for the even distribution of water, but requires the shifting of considerable earth and a greater expense in the preliminary preparation of the soil than does the first method described.

Furrow Method.— Under this method parallel furrows are plowed which lead from the lateral used across the rows of crop to be irrigated. A small opening is made in the ditch to let the water between each of these rows. There are numerous devices for regulating the turning of water into the furrows from the field lateral, the simplest being the placing of a dam of canvas or earth below the opening through which water is to be run; but in many places the lateral is constructed permanently, often consisting of a plank or cement flume with openings in its side, having adjustable gates by which the amount of water delivered to each furrow can be regulated. In the application of this water the attention of an irrigator is required to see that the proper amount is kept in each furrow, and that it does not break out and flood the surface, leaving the furrow beyond the break without moisture. One man can take care of a considerable number of these furrows at once, and under favorable conditions can irrigate as large an area in a given time as by the flooding system. The success of this system depends on having a soil in which vertical percolation is not excessive and lateral movement is adequate. The furrows must be so constructed as to maintain the velocity of the water within the safe limit permitted by the character of the soil; otherwise there will be an injurious erosion of the furrows. Even when the land has considerable slope the furrows can be given such direction as to make the adoption of the method safe and practicable. Where these conditions are secured it has several advantages; it thoroughly soaks the soil and accomplishes the distribution of moisture without saturating the surface and causing it to run together, as it does where water stands on it. In cultivating crops the displacement of the soil is reduced to a minimum; hence the labor is reduced and the cost is less than by any method which distributes water so evenly and thoroughly. There is less loss from

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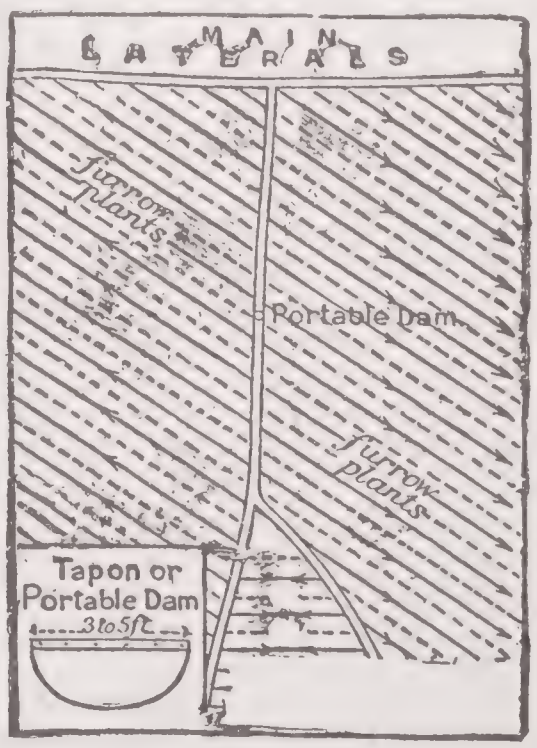
evaporation because a less area of water is exposed to the action of the air and sun. Where the surface is well prepared the distribution is almost automatic, and may be left to itself for hours if necessary. Cultivation after irrigation can be begun sooner and subsequent loss from evaporation in this way be curtailed.

Subirrigation.—Introducing water below the surface for the watering of crops has several obvious theoretical advantages, such as the preventing of loss by evaporation, distributing water at levels which will encourage plants to strike their roots deep in the soil, and the reducing of frequent surface cultivation, which have caused inventors and cultivators to labor to secure a system which would be effective and cheap enough for general adoption, but thus far without complete success. This method of irrigation has not as yet passed the experimental stage, and the acreage irrigated is insignificant.

Irrigation Laws and Institutions.—In France, Spain, Italy, Egypt, and India all the more important irrigation works are owned and controlled by the government. Originally many of these works were private property, but the complications growing out of private ownership of streams and the controversies over their distribution among these owners led to the assumption of governmental ownership and control of both ditches and streams. In undeveloped and sparsely settled countries, like Australia and the United States, where the adoption of irrigation is of more recent origin, nearly all that has been done is the result of private enterprise. This is not wholly true of Australia. In the provinces of Victoria and New South Wales a number of important dams have been built as public works, and provision is made for loans by the provinces to aid in the building of ditches by private parties. In Canada all streams are State property, and all irrigation works are built under licenses issued by the government, and in accordance with plans prepared by or approved by it. The United States long stood practically alone among important irrigation countries in leaving the work of reclamation to the unaided efforts of private capital and in the prodigality of the surrender of public control of streams. In one respect the policy pursued has been successful. It has resulted in an immense investment, somewhere between $100,000,000 and $200,000,000, but it may be said that the end of this sort of development appears almost to have been reached, and much may be expected from a large measure of State or National aid and supervision. Until the present century practically all laws governing the control of rivers used in irrigation and distribution of water were enacted by the States. The general government, in 1866, apparently abrogated control over non-navigable streams used in irrigation by recognizing local laws and customs governing the appropriation and use of water. Subsequently Congress passed an act defining what a right to the use of water in the irrigation of desert land should embrace. The general government, however, does not directly exercise control over streams. Many of the State laws are ambiguous, and the laws of the different States of the arid region vary widely in character and purposes. In California, Oregon, and Washington, and in the North and South Dakotas, the common law doctrine of riparian rights is a part of the organic law. The Supreme Court of Utah, in setting this doctrine aside, states that "this right is utterly irreconcilable with the use of water for irrigation." In Wyoming, Colorado, Montana, Idaho, Utah, Nevada, and the Territories of Arizona and New Mexico, the doctrine of riparian rights has been abrogated either by legislation or court decision. The constitutions of both Nebraska and Kansas recognize riparian rights, while the laws permit of the diversion and appropriation of streams in irrigation. In only a few of the States most concerned in these matters is there legislation for adequate public control of streams and systematic division of their waters among users. These conditions call for relief that must come by the enactment of laws providing for simpler and more efficient methods of administration.



The Federal government has already taken an important step toward a solution of these difficult matters by providing for the irrigation of the thousands of square miles of arid lands located in the Western States and Territories of the United States under government supervision, through the act known as the National Irrigation Act. The act is based on the rule that the proceeds of

sales of public lands shall be assigned from year to year to the building of irrigation works under contracts approved by the secretary of the interior, but only when there is sufficient money on hand to insure the completion of the work. This act, passed by Congress in 1902, is very complete and comprehensive in its scope, and automatic (so to speak) in its plan of action. It is estimated that during the 30 years following 1902 at least $150,000,000 from the proceeds of the sale of lands will be available without further appropriations for public irrigation works.

The act made the receipts from public lands, including those of the fiscal year 1901-02, stated to amount to some $6,000,000, immediately available, and the average annual sum of $3,000,000 (likely to be constantly increased) can be used each year for a steady continuation and enlargement of any work for which contracts are made.

The plan of the act further provides against the acquirement of large tracts of land by individuals or companies by limiting the area to be owned by one person to 160 acres, subject to the provisions of the National Homestead law, including its limitations, charges, and conditions. At least half of the arid land so acquired must be improved by irrigation and the owner must reside on or near the land. After a plan of irrigation of a tract of land owned by several parties has been completed at government expense and the works are in order, the owners will be required to pay back to the government in not less than 10 annual instalments the estimated cost of the construction of the works, the money so paid to be returned to the general reclamation fund.

In 1907 the government was engaged upon twenty-five projects that should add 3,198,000 acres to our crop-producing area. Nine undertakings were then practically completed, and thirteen others were planned, which should reclaim 3,270,000 acres. Four years after the passage of the act 1,267 miles of canals had been dug, forty-seven tunnels with an aggregate length of 9½ miles excavated, ninety-four large structures, including great dams in Idaho and Nevada, erected, 670 headworks, flumes, etc., completed, 376 miles of wagon roads built, and topographic surveys had covered 10,970 square miles. Eight new towns have been established, 100 miles of branch railroads built, and 10,000 people settled in a country formerly uninhabitable. A special reclamation service having been created in the United States Geological Survey, the secretary of the interior delegated to it the management of irrigation works. While not limited to any particular plan of securing the requisite supply of water, the bureau must conform to State laws on this subject.

ELWOOD MEAD.

Irtish (ēr'tish), a river of Siberia, the chief affluent of the Obi, rises at the E. end of the Altai mountains, passes through Lake Saisan, breaks through the Altai in the W. at the bottom of a savage gorge, and flows N. W. across the steppes of Western Siberia to join the Obi, from the left, at Samarow. At that point it has a width of 2,000 yards; its total length is 1,620 miles; the area of its basin, 647,000 square miles. The important towns of Semipalatinsk, Omsk, and Tobolsk stand on its banks. From April to November it is navigable from its mouth as far as Lake Saisan; during the rest of the year traffic is carried on by means of sledges. Its current is gradually shifting E. Its best known tributaries are the Buchtarma and Om from the right, and the Tobol and Ishim from the left.

Irus (ī'rus). (1) A beggar of Ithaca, an attendant of Penelope's suitors. (2) The hero of Chapman's "Blind Beggar of Alexandria."

Irving, Edward, a Scotch divine; born in Annan, Dumfries, Aug. 4, 1792. He was educated for the ministry at the University of Edinburgh. He taught at Haddington and Kirkcaldy, and in 1819 became assistant to Dr. Chalmers in Glasgow. He went to London in 1822, where he preached in a little chapel and won immediate fame, later removing to a larger church. Not long afterward he was accused of heresy, and after an inquiry that extended over nearly two years he was convicted. A contributing cause of this charge was the introduction into his service of what was called a supernatural manifestation of the Spirit, evincing itself in an unintelligible rhapsody from one or other of the congregation, and which received the appellation of the "unknown tongues." His followers are often called Irvingites. In 1833 he was deposed by the presbytery of Annan, which had licensed him. The Catholic Apostolic Church, established by his adherents soon after his death, is still in existence in many European countries, in the United States and Canada, and in Australia and India. Its members, besides believing in the return of the gift of tongues, maintain a hierarchical organization, with apostles, prophets, evangelists, pastors, elders, deacons, etc., and a highly ritualistic order of worship, in conformity, as they declare, with the constitution of the primitive Christian Church itself. Irving's works were published in London in 1864-65. He died in Glasgow, Dec. 7, 1834.

Irving, Sir Henry (originally **John Henry Brodribb**), an English actor; born in Keinton, Feb. 6, 1838. He was for a time a clerk in London, but adopted the theatrical profession and made his first appearance at Sunderland in 1856. He played in Edinburgh for nearly three years, and first ap-

peared in London at the Princess's Theater in 1859. After playing in Glasgow, and for several years in Manchester, he returned to London in 1866, and there as Digby Grant in the comedy of "Two Roses" (1870) he made his first marked success. As Mathias in "The Bells" he was even more successful, and as his work expanded he became famous in "Eugene Aram," "Richelieu," "Hamlet," "Macbeth," "Othello," "Richard III.," "Louis XI.," and as Shylock, Benedick, Mephistopheles, Becket, etc. Much of his best acting was done in association with Ellen Alice Terry (*q. v.*), with whom he many times visited the United States. As a manager he was no less distinguished than for his genius as an actor, and as a writer and public speaker he enjoyed genuine popularity. He was knighted in 1895. Irving's mannerisms and eccentricities of speech and gesture did not escape censure, but in spite of them the intellectual qualities of his acting and his unexcelled skill in stage setting made him at last the dominant figure among his English-speaking contemporaries in art. He died in Bradford, England, Oct. 13, 1905.

Irving, John Beaufain, an American artist; born in Charleston, S. C., Nov. 26, 1825. He studied art in Düsseldorf. His paintings include: "The Disclosure"; "Wine Tasters"; "The End of the Game"; "The Bookworm"; "Cardinal Wolsey and His Friends"; etc. He died in New York city, April 20, 1877.

Irving, Pierre Munroe, an American lawyer; born in 1803; nephew of Washington Irving; was graduated at Columbia College in 1821, and later was admitted to the bar. In 1826, at the request of his uncle, he took charge of publishing the "Life of Columbus" in London. He also published "The Life and Letters of Washington Irving," and edited "Spanish Papers and Other Miscellanies" (1866). He died in New York city Feb. 11, 1876.

Irving, Washington, an American author; born in New York city, April 3, 1783. His father had emigrated from Scotland before the Revolution. He was originally educated for the legal profession and in 1806 was called to the New York bar, but his tastes were all in the direction of literature, in whose fields he made his first appearance by the publication in 1802 of the "Letters of Jonathan Oldstyle," in the New York "Morning Chronicle," a journal edited by his brother, Dr. Peter Irving. He sailed for Bordeaux, visited the South of France and Italy, and then returned across Mount St. Gothard, through Switzerland, to Paris. After visiting Holland and England he returned in March, 1806, to the United States. Throughout 1807 he acted as principal contributor to the periodical "Salmagundi," which terminated in January, 1808, and in December, 1809, appeared his celebrated "History of New York by Diedrich Knickerbocker." During the war with Great Britain in 1812-15 he edited the "Analectic Magazine" in Philadelphia, and acted also for a time as aide-de-camp and military secretary to the governor of the State of New York.

In May, 1815, he embarked for England, with the intention of making a second tour of Europe, but this was frustrated by the embarrassments of his brothers' house, occasioned by the conclusion of peace with Great Britain. Having taken up his abode in London, he commenced in 1818 the series of papers entitled the "Sketch-Book," which were transmitted for publication to New York. Up to 1832 Irving continued to reside in Europe. During this period he wrote some of his most famous works, including "Bracebridge Hall" (1822); the "Tales of a Traveler" (1824); the "Life of Columbus" (1828); a "Chronicle of the Conquest of Granada" (1829); "Voyages of the Companions of Columbus" (1831); and "The Alhambra" (1832). In the spring of 1832 Irving returned to New York. In 1835 appeared his "Tour on the Prairies." The same year he published "Abbotsford and Newstead Abbey" and "Legends of the Conquest of Spain." "Astoria, or Anecdotes of an Enterprise Beyond the Rocky Mountains" appeared in 1836, and the "Adventures of Captain Bonneville" in 1837. In 1842 Irving was appointed minister to Spain. He continued in this office till 1846, when he returned home. His later works include: "Oliver Goldsmith" (1849); "Mahomet and His Successors" (1849-50); and the "Life of George Washington" (1855-59). He died at "Sunnyside," near Tarrytown, N. Y., Nov. 28, 1859.

Isaac, one of the patriarchal ancestors of the Hebrew nation and of Christ, son of Abraham and Sarah. At the age of 40 he married Rebekah, by whom he had two sons, Esau and Jacob; the former becoming the founder of the Edomites, and the latter, under the name of Israel, the progenitor of the Israelites. Isaac is said to have lived to attain his 180th year.

Isaac I., Comnenus, Byzantine Emperor, was the first of the Comneni who attained the imperial dignity. Under the successors of Basil II. Isaac served in the army, winning the hearts of officers and men by his prudence and uprightness, and on the deposition of Michael VI. in 1057 was elevated to the throne. He established the finances of the empire on a sounder and more stable footing, and, braving the patriarch's threat of excommunication, even laid the clergy under contribution at the tax collections. He repelled the Hungarians attacking his N. frontier; and then, resigning the crown (1059), retired to a convent, where he lived two years longer. He was one of the most virtuous and able emperors

of the East. There are extant from his pen scholia and other works on Homer.

Isaac II., Angelus, connected through his mother with the Comnenian emperors, became sovereign of the East in 1185, and reigned 10 years. Isaac was a vicious and cowardly prince, and his reign was a period of war and tumult. He was dethroned, blinded, and imprisoned by his brother Alexius in 1195. Eight years later he was restored to the throne and reigned for a period of six months, when he was again dethroned, and soon after he died in prison.

Isabella of Bavaria, daughter of Stephen II., Duke of Bavaria; born in 1371, married to Charles VI. of France, 1385; died miserably in Paris, after a reign marked by intrigues and crimes, in 1435.

Isabella of Castile, daughter of John, 2d king of Castile; born in 1450. By her marriage, in 1469, with Ferdinand, 5th king of Aragon, the two crowns were united. The subsequent conquest of Granada and expulsion of the Moors left Ferdinand and Isabella the first sovereigns of united Spain. Isabella was a princess of remarkable abilities and such rare domestic virtues that her life and conduct became the pattern and example to all the queens and married ladies of the age. It was through Isabella's exertions and influence that Columbus obtained the small armament that enabled him to reach the New World. In the old fortress of Simancas, where the archives of Castile are kept, have been found some letters in Isabella's own handwriting, wherein she boasts of establishing and upholding the tribunal of the Holy Inquisition; while other official documents disclose the fact that the estates of the unhappy victims who perished by the flames were wholly devoted to the queen's use, leaving the destitute widows and children in absolute poverty. These letters have been the occasion of staining the hitherto respected character of Isabella, but it must be said, in exoneration of the queen, that in her time, and chiefly in her country, heresy was generally considered the greatest of crimes, and that the burning of heretics was held as legitimate a thing as is, in our own time, the hanging of a murderer. It must be recorded also that, so far from being avaricious, Isabella had her treasury always empty, and that if some money came to her by the way of the Inquisition this bloody inheritance was certainly used in undertakings of general benefit, perhaps to pay some of the bonds of the caravels on which Columbus came to discover America. She died in 1504.

Isabella II., Queen of Spain; born in Madrid in 1830. The Salic law, which had previously been in force in Spain, was repealed by the Cortes in order that she might inherit the crown. The death of her father in 1833 advanced Isabella at the age of three years to the throne. Her uncle, Don Carlos, who in his own right, and that of his son, regarding the abrogating of the Salic law as a direct injustice and violation of their interests, refused to take the oaths of allegiance, and a large portion of the Spanish people, deeming it beneath their honor as men to be swayed by a woman, supported Don Carlos in his treason, and a civil war at once broke out; which, after raging for nearly seven years, was finally terminated in 1840 by the defeat of the Carlists and expulsion of their chiefs and leaders. At the age of 13 Isabella was declared of age, and at 16 was married to her cousin Don Francisco de Assis; the realm being governed, during her long minority, by her mother Donna Christina, and Espartero, Duke of Victory, who were appointed severally to the post of regent. Dethroned by the revolution of September, 1868, Isabella left Spain, accompanied in her flight by the king-consort and her four younger children, and took refuge in France. After 1840, when she was married against her will to a man said to be unfit for the conjugal state, her private character was exposed to considerable censure. She died April 9, 1904.

Isabella the Catholic, Order of, a Spanish order of knighthood founded by Ferdinand VII. in 1815. It is conferred for all kinds of merit.

Isabey, Eugene Louis Gabriel (ēz-ä-bā′), a French painter; born in 1804. His pictures are in all the leading European galleries. Some are in American collections. "French Hospitality" is a well-known canvas of his. He died in 1886.

Isabey, Jean Baptiste, a French portrait painter; born in Nancy, April 11, 1767. He painted portraits of several of the notabilities of the Revolution, as Saint-Just, Barrère, Collot d'Herbois, and others. Afterward he became court painter to Napoleon, and painted him and most of his generals, and important events in his life. After Napoleon's fall Isabey worked for the Bourbon sovereigns. He excelled also as a miniature painter, and as a painter on porcelain. His "Isabey's Boat" (1796), "Review of Troops by the First Consul" (1804), "Members of the Congress of Vienna" (1815), and "Staircase of the Paris Museum," a water-color (1817), are his most important compositions apart from portraits. He died in Paris, April 18, 1855.

Isæus (ī-sē′us), an Athenian orator, the pupil of Lysias and Isocrates. He lived in the first half of the 4th century B. C., was wholly unconnected with public affairs, and devoted himself to the task of instructing others. Eleven of his orations are still extant.

Isaiah (ī-zā′yä), one of the greatest of the Hebrew prophets. He was the son of Amos, whom some of the fathers supposed to be the prophet Amos, the names being identical in Greek; in Hebrew, however, they are different, the prophet being Amos, and Isaiah's father Amots. As in the vision recorded in Isaiah vi., the prophet is represented as being in the court which none but the descendants of Aaron might enter, he was perhaps a priest. He was born probably between 783 and 788 B. C. He married a woman to whom, as to him, prophetic gifts were given (Isa. viii: 3). One of his sons was called Shear-jashub = a remnant returns, or a remnant will return (vii: 3); another Maher-shalal-hash-baz = hasten to the spoil, quickly carry off the prey. Isaiah exerted great influence at the court of Jerusalem under Ahaz, and yet more under Hezekiah. He was contemporary with Amos, Hosea, Micah, and perhaps with Joel. Besides his prophecies, he wrote also biographies or histories of Uzziah (II Chron. xxvi: 22), and Hezekiah (xxxii: 32). Tradition says that he was sawn asunder by order of King Manasseh, his tragic fate, it is supposed, being alluded to in Heb. xi: 37.

The Prophecies of Isaiah, the first and most important of the prophetic books. It is headed "The vision of Isaiah the son of Amoz, which he saw concerning Judah and Jerusalem in the days of Uzziah, Jotham, Ahaz, and Hezekiah, Kings of Judah." If chapter vi. is chronologically the earliest of any, and describes his first call to the prophetic office, his utterances would commence in 758, 757, or 756 B. C. If the prophecies are arranged in the order of time, then chapters i.-v. would belong to an earlier period. Omitting these writings of uncertain date, the next utterances are in the reign of Ahaz, none apparently belonging to the 16 years of Jotham's reign. He continued at least till the fourth year of King Hezekiah, 712 B. C., a period of 44 to 46 years. This is the minimum span of his prophecies; the maximum is much greater.

The book naturally divides itself into three parts: (1) chapters x. to xxxv., the earlier prophecies; (2) chapters xxxvi. to xxxix., an historic appendix or intercalation; and (3) chapters xl. to lxvi. the later prophecies. The standpoint in this third section is that of the Babylonian captivity, and Cyrus, who set the two tribes free, is mentioned by name (xliv: 28, xlv: 1). Hence Koppe (A. D. 1779–1781) supposed a second author, a view adopted by Doderlein, Eichhorn, Justi, Paulus De Wette, Gesenius, Ewald, and nearly all rationalistic critics. On the other hand Hengstenberg, Havernick, Keil, etc., have maintained the integrity of Isaiah. Viewed as a poetic composition the book of Isaiah exhibits genius of a very high order. There are numerous quotations from or references to Isaiah in the New Testament, chapter liii., and other prophecies (vii: 14; ix: 1, 2; liii: 4; lxiii: 1–3) being considered Messianic and applied to Jesus. Hence Jerome considered that Isaiah should rather be called an evangelist than a prophet, and he is frequently called the fifth Evangelist.

ISAIAH, BY RAPHAEL.

Isambert, François André (ē-sam-bār′), a French lawyer; born in Aunay (Eure-et-Loire) Nov. 30, 1792. He interested himself actively in the condition of the liberated slaves in the French West Indian colonies. After the July revolution of 1830 he was appointed councillor of the Court of Cassation and elected a member of the Chamber of Deputies. From this year down to 1848 Isambert belonged to the Constitutional opposition, signalizing himself as a friend of liberty and an opponent of the Jesuits. He wrote standard works on French law. He died in Paris, April 13, 1857.

Isar, or **Iser** (ī′zer), a river of Bavaria, rises in the Tyrol, N. E. of Innsbruck, and flows 220 miles, generally in a N. and N. E. direction, till it falls into the Danube near Deggendorf. Munich and Landshut are on the banks "of Iser, rolling rapidly." Hohenlinden is 20 miles away. In the first part of its course it is an impetuous mountain torrent; and even after it leaves the Alps it has many rapids and islands. Large quantities of wood are floated down the Isar from the mountains. Area of its drainage basin, 3,545 square miles.

Isatine (ī′zä-tēn), a product obtained by suspending finely powdered indigo in three times its weight of boiling water, and adding gradually nitric acid of sp. gr. 1.35 till the blue color has disappeared. On cooling, crude isatine is deposited, and may be purified by dissolving in potash, precipitating with hydrochloric acid, and crystallizing from alcohol. It crystallizes in the form of brilliant yellowish-red prisms, which dissolve readily in boiling water, in alcohol, and in ether. It may also be produced synthetically by the action of oxidizing agents on amido-oxindol, or by the reduction of orthonitro-phenyl glyoxalic acid in alkaline solution. Isatine does not unite with acids, but rather plays the part of an acid. It dissolves in potassic hydrate, forming a dark violet-colored solution of potassium isatine, which, on addition of argentic nitrate, gives carmine-red crystals of argentine isatine, $C_8H_4NO_2Ag$. It also yields crystalline compounds with alkaline hydric sulphites. Boiled with concentrated nitric acid, it is converted first into nitro-salicylic acid, and finally into trinitro-phenol. When strongly heated, isatine fuses and sublimes in part unchanged.

Isatis (ī′sā-tis), a genus of plants, order *Brassicaceæ*. *I. tinctoria*, the woad, is an annual plant, native of Europe, occasionally cultivated here for the sake of its leaves, which yield a dye that may be substituted for indigo. It grows about four feet high, with large leaves clasping the stem with their broad bases; flowers yellow, large, in terminal racemes.

Isaure, Clemence (ē-zōr′), a rich and noble lady of Toulouse, who instituted, about the year 1490, the "Floral Fête" of Toulouse, and left to the city a considerable sum to defray the expenses of this concourse of poetry.

Isauria (is-ōr′ē-ä), in ancient geography, a district of Asia Minor, occupying the summit and N. slopes of Mount Taurus. The people were stern and savage, and occupied themselves principally in robbery and piracy. At length their depredations and those of their neighbors, the Cilicians, became so formidable that the Roman proconsul, P. Servilius, chased them into their mountain fastnesses and coerced them into submission in 76 B. C., for which exploit he acquired the surname Isauricus. Nevertheless the Isaurians were not subdued. Pompey, in warring against the Mediterranean pirates, drove them off the sea; but they soon returned again. Indeed so far was their power from having been broken that they conquered the Cilicians, and remained the terror of the neighboring states down to the 4th century. In the reign of the Emperor Gallienus (253–268) there even arose among this savage folk a rival emperor, Trebellianus, who, however, was finally crushed. This same people also gave two emperors to Byzantium, Zeno I. (474–491) and Leo III. (718–741); the descendants of the latter ruled over the empire of the East for three generations. From the 5th century onward the Isaurians gradually disappear from history.

Isca Silurum. See CAERLEON.

Ischalis. See ILCHESTER.

Ischia (is′kē-ä), the ancient Ænaria and Pithecusa, an island on the N. side of the entrance to the Bay of Naples, 6 miles from the mainland. Area, 26 square miles; pop. (1904) est. 25,000. Ischia is a favorite place of summer resort, being noted for the excellence of its warm mineral waters, the great richness of its soil, the exquisite flavor of its fruits and wines, and the enchanting character of its scenery. Its highest point is the volcanic Monte Epomeo, 2,608 feet, the last outbreak of which occurred in 1302. In 1881 Casamicciola was nearly destroyed by two earthquake shocks. A still more dreadful catastrophe befell it on Sept. 28, 1883, when the town was utterly overwhelmed, only four or five buildings being left standing, and 4,000 or 5,000 persons lost their lives. The inhabitants grow fruits, wine, and olive oil, and carry on fishing. Chief towns: Ischia, a bishop's seat; Casamicciola, and Torio.

Ischium (is′kē-um), one of the bones in the pelvic arch in vertebrated animals. It forms the posterior and inferior part of the os innominatum, and bounds the obturator foramen in the lower half of its extent.

Ischl (ish′el), a town of Upper Austria, on the river Traun, amid magnificent Alpine scenery. It is the chief town of the district called the Salzkammergut. The situation of Ischl, and the saline baths established in 1822, attract 4,000 or 5,000 visitors annually.

Ischyromys (is-ker′ō-mus), the typical genus of the family *Ischyromyidæ*. It is known only by a North American fossil rodent, *I. typus*, described by Leidy from remains found by Hayden in Miocene deposits in the "Bad Lands" of Wyoming. It resembles the musk rat, but has closer affinity to the squirrels, and certain resemblances to the beavers.

Isère (ē-zār′), a department in the S. E. of France, round which on the N. and W. flows the river Rhone. It was formed out of the ancient province of Dauphiné; area, 3,200 square miles; pop. (1906) 502,315. The surface is level in the N. W., but becomes mountainous on the E. and S. E., where the scenery is very imposing. Mont du Midi, on the S. E. border, rises to 13,088 feet. The chief river, besides the Rhone, is its left-hand tributary, the Isère, which,

rising in the Alps at an altitude of 7,540 feet, flows S. W. to join the Rhone above Valence, after a total course of 180 miles (102 navigable). The products include wheat, wine, stone fruits, medicinal plants, and hemp. Cheese is made; and silkworms are reared. The department is rich in mineral products; iron, coal, and turf are worked, and to a less extent marble, slates, and gypsum. The industrial activity is considerable, particularly in the manufacture of iron and steel goods, gloves, silk stuffs, cloth, linen, paper, straw hats, liqueur (Chartreuse), etc.

Iserlohn (ī′zer-iōn), a manufacturing town of Prussian Westphalia. The calamine mines are celebrated. In the neighborhood is the Dechen stalactite cave, 292 yards long, discovered in 1868.

Isfendiar (is-fend′yär), in Mahometan mythology, the angel which guards the chastity of women and preserves domestic peace.

Ishani (ish-ä′nē), the Hindu personification of the active power of Isa or Iswara. It is represented under the form of a woman, and regarded as the goddess of nature and protectress of water. Her chief fête is called Durgotsava.

Ishbi-Benob (ish″be-ben″ob), a giant who was on the point of killing David in battle, but was slain by Abishai. (II Sam. xxi: 16, 17.)

Ishbosheth (ish′bō-sheth), a son and successor of Saul. Abner, Saul's kinsman and general, so managed that Ishbosheth was acknowledged king at Mahanaim by the greatest part of Israel, while David reigned at Hebron over Judah. Involved in a long and unsuccessful war against David, and abandoned by Abner, he was assassinated.

Ishim (ē-shēm), a town in Siberia, important as a trade center. It is the oldest of Siberian towns. A river and a territory adjacent likewise bear the name.

Ishmael (ish′mā-el), a son of Abraham, by Hagar, who on the birth of Isaac, son of Sarah, was sent forth from his father's house with his mother. After dwelling in the desert for a long time, he became a great hunter and mighty warrior. The Arabs regarded Ishmael as the father of their nation and the author of their language. He lived 137 years.

Ishmael I., founder of the dynasty of the Sophis of Persia, was a descendant of Ali, son-in-law of Mohammed, and began his reign in 1502. He gained many victories and established the Persian throne upon a solid basis. He died in 1523.

Ishmael II., succeeded Thomas on the throne of Persia in 1576. He was a sanguinary prince and murdered eight of his brothers. He was poisoned in 1577, by his sister, out of religious zeal, Ishmael being of a sect held heretical by the other Mohammedans.

Ishmaelites, Ismaelites, or **Ismaelians,** a Mohammedan sect originating in the 1st century of the Hegira, and deriving its name from Ishmael or Ismael, one of Ali's descendants. From the 8th to the 12th century they were powerful in the East, and distributed themselves over Irak, Syria, Persia, and Egypt.

Ishpeming, a city in Marquette co., Mich., on the Chicago and Northwestern, and the Duluth, South Shore, and Atlantic railroads; ¼ mile W. of Marquette. It is the mining trade center for the great Marquette iron range, one of the most noted in the Lake Superior region, and the mining district of Ishpeming contains 14 of the most productive mines in the State. In the district also are valuable veins of gold, silver, and marble. The general offices of the Lake Superior and Ishpeming railroad are located here, and besides the mines and iron works there are manufactories of boilers, wagons and sleighs, machinery, and worked lumber. The city has trolley connection with Negaumee, a National bank, public library, water supply from Lake Superior, St. John's School, several weekly periodicals, and an assessed property valuation of over $8,500,000. Pop. (1890) 11,197; (1900) 13,225; (1910) 12,448.

Isiac Table, a spurious Egyptian monument, consisting of a plate of copper bearing a representation of most of the Egyptian deities with Isis in the center, said to have been found by a soldier at the siege of Rome, in 1525.

Isidore of Seville (Isidorus Hispalensis), a Spanish ecclesiastic; born about 560. He succeeded Leander as Archbishop of Seville in the year 600. Two of his brothers, Fulgentius and Leander, were, like himself, bishops, the first of Carthagena, the second Isidore's successor in the see of Seville. The episcopate of Isidore is rendered notable by the two half-ecclesiastical, half-civil councils at Seville in 618 or 619, and at Toledo in 633, which were held under his presidency, and the canons of which may almost be said to have formed the basis of the constitutional law of the Spanish kingdoms, both for Church and for state, down to the great constitutional changes of the 15th century. A collection of so-called decretals is called Isidorean (or Isidorian) because he collected at least some of them. His death, which occurred in 636, forms one of the most remarkable scenes in early Christian history. When he became sensible of the approach of death he summoned his flock to his bedside, exhorted them to mutual forbearance and charity, prayed their forgiveness for all his

own shortcomings in his duty, and directed his property distributed among the poor.

Isinglass, a substance that is almost wholly gelatine, 100 grains of good dry isinglass containing rather more than 98 of matter soluble in water. It is obtained principally from Russia, but considerable quantities are also exported from Brazil, North America, and the East Indies. The Russian isinglass is chiefly obtained from the sounds or swimming-bladders of the sturgeon, which is very plentiful in the Caspian and rivers flowing into it; the American is obtained from the cod, sturgeon, hake, etc.; and the sounds of a great many fish produce it. It is the basis of the Russian glue which is preferred to all other kinds for strength. Isinglass receives its different shapes in the following manner: The sounds are taken from the fish while sweet and fresh, slit open, washed from their slimy matter, divested of a very thin membrane which envelopes the sound, and then exposed to stiffen a little in the air. In this state they are formed into rolls about the thickness of a finger, and in length according to the intended size of the staple; a thin membrane is generally selected for the center of the roll, around which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inward. Isinglass is best made in the summer, as frost gives it a disagreeable color, deprives it of its weight and impairs its gelatinous principles. Isinglass boiled in milk forms a mild, nutritious jelly, and is thus sometimes employed medicinally. A solution of isinglass in water, with a very small proportion of some balsam, spread on silk, is the court plaster of the druggist. Isinglass is also used in fining liquors of the fermented kind, and in making mock pearls, stiffening linens, silk, gauzes, etc. With brandy it forms a cement for broken porcelain and glass. It is also used to stick together the parts of musical instruments.

Isis, the principal goddess of the Egyptians, the symbol of nature or pantheistic divinity, the mother and nurse of all things. According to the Diodorus, Osiris, Isis, Typhon, Apollo, and Aphrodite (Venus), were the children of Zeus and Hera (Jupiter and Juno), Osiris, the Dionysos (Bacchus) of the Greeks, married Isis (sun and moon), and they both made the improvement of society their special care. Isis discovered the valuable qualities of wheat and barley, which had till then grown wild, unknown to mankind, and Osiris taught how to prepare them. In gratitude for these benefits the inhabitants always presented the first ears gathered as an offering to Isis. Isis thus corresponded to the Greek Demeter (Ceres). According to Plutarch's learned treatise ("On Isis and Osiris") Osiris and Isis were the illegitimate offspring of Saturn and Rhea. Osiris was born the first, and at his birth a voice cried, "The lord of the world is born." On the second day Rhea was delivered of Aroueris, or the elder Horus (Apollo), on the third of Typhon, on the fourth of Isis, and on the fifth of Nephthys, who was called Teleute, the Consummation, though others give her the name of Aphrodite and Nike (Victory). Of these five children there were three fathers — Helios, Saturn, and Hermes. Typhon married Nephthys; Osiris and Isis loved each other even in their mother's womb. Osiris, the good spirit, was persecuted by Typhon, the bad spirit, who, by stratagem, shut him up in a chest and threw him into the sea. When Isis learned this she cut off one of her locks, put on mourning garments, and wandered about disconsolate in search of the chest. Meanwhile she learned that Osiris, on a certain occasion, deceived by Nephthys, who was enamored of him, had mistaken Nephthys for herself, and that the child which was the fruit of this union had been exposed by its mother. Isis therefore sought the child, and bred him up under the name of Anubis.

The chest in which Osiris was shut up was meanwhile driven ashore at Byblos and thrown on a bush, which, having suddenly grown into a beautiful tree, had entirely inclosed it. This tree was afterward cut down by the king of the country as a curiosity, and used as a pillar in his palace. The chest was finally obtained by an artifice of Isis, but the body, being afterward discovered by Typhon, was torn by him into 28 or 26 pieces, which he scattered over the country. On discovering this Isis proceeded to collect the fragments, and Osiris having returned to life, Isis bore to him Harpocrates, the god of silence, who was lame in his lower limbs. As the goddess of fecundity, and the universal benefactress, she superintended the cure of human maladies, and even in Galen's time several medicines bore her name. After her death she was reverenced as the chief of the divinities.

According to the account of Herodotus the Egyptians represented Isis under the form of a woman, with the horns of a cow, as the cow was sacred to her. Another tradition also related that Isis, in the shape of a young cow, became the mother of Apis by a ray from heaven (Osiris); that is, the sun and moon sustain the earth. She is also known by the attributes of the lotus on her head and the sistrum in her hand, a musical instrument which the Egyptians used in the worship of the gods. The dress of Isis consists of a close under garment, and a mantle drawn together and fastened in a knot on her breast. Her head is covered with the Egyptian hood. Sometimes, like the Diana of Ephesus, the universal

mother, she is represented with a great number of breasts. Among the Romans Isis afterward received in countenance, figure, and dress, somewhat of the character of Juno. A foreign character is to be recognized only in the mantle and fringed veil, and other attributes.

She was particularly worshiped in Memphis, but at a later period throughout all Egypt. A festival of eight days (the festival of Isis) was annually solemnized in her honor, consisting of a general purification. From Egypt the worship of this goddess passed over to Greece and Rome. Pausanias describes the manner in which her worship was celebrated in Greece. The priests of Isis were bound to observe perpetual chastity, but when her worship passed into foreign countries it became a cloak for the grossest licentiousness. The abuses which it occasioned at Rome caused its frequent prohibition there. It was, however, repeatedly revived. The Romans never considered the worship, which was introduced among them by Sulla (86 B. C.), altogether reputable, and its attendant immorality was vigorously lashed in the satire of Juvenal.

Isis, the technical name of the mare's tail coral (*Isis hippuris*), which consists of a central axis of coral structure covered and invested in the living state by a soft outer tissue in which the numerous little coral polypes are imbedded. The characteristic composition of the coral of isis has given to it the popular name above mentioned, from its general likeness to the plant known as the "mare's tail." The coral consists of a branching stem of alternating joints of horn and lime; the branches springing from the limy joints. In *Mopsea*, an allied coral to isis, the branches take origin from the horny joints. The isis belongs to that kind of coral structure to which the term sclerobasic is applied. The distinctive peculiarity of this kind of coral consists in the coral axis being internal, and the living flesh external. The coral, however, is really outside the living flesh, because the living substance is inverted, the internal surface being turned to the outside.

To the isis and all other sclerobasic corals, the term "foot secretion" has been applied by Dane. The familiar red coral of commerce belongs to the same type of coral structure as the isis. The order in which the isis is included is that of the *Alcyonaria*, the distinguishing feature of which is the possession by the little polypes — or separate individuals of the colony — of eight tentacles or feelers surrounding the mouth, these organs being pinnate or fringed in a featherlike manner. The internal soft parts of the body are present in multiples of four. The isis is found chiefly in the Indian Seas, in the Pacific Ocean, and on the coasts of America. It is classified in the family *Gorgonidæ*, one of the divisions of the order *Alcyonaria* mentioned above.

Isis, a genus of corals, the typical one of the sub-family *Isidinæ*. The sclerobasis consists of alternate calcareous and horny segments, the former giving rise to branches. *I. hippuris* is from Amboyna, *I. polyantha* from the American seas, and *I. coralloides* from those of India.

Iskanderbeg. See SCANDERBEG.

Isla, José Francisco de (ēs'lä), a Spanish satirist; born in Vidane, March 24, 1703. He was a Jesuit and taught successfully in the Jesuit seminaries for years, but the expulsion of his order from Spain reduced him to destitution, and he died in want. He is without a rival among his countrymen, Cervantes always excepted, as a wit and satirist; the prodigious popularity of his "Life and Adventures of Friar Gerundio de Campazas," upon its first appearance in 1758 (under the pseudonym of "F. Lobon de Salazar"), being but a well-won tribute to its unhackneyed drolleries and epigrammatic style. He died in Bologna, Nov. 2, 1781.

Isla de Pinos. See ISLE OF PINES.

Islam (is-läm' or is'lam), the proper name of the Mohammedan religion; designating complete and entire submission of body and soul to God, His will and His service, as well as to all those articles of faith, commands, and ordinances ordained by Mohammed the prophet. The word islam is sometimes figuratively applied to the whole Mohammedan world.

Island, a tract of land encompassed with water, whether of the sea, a river, or a lake — in contradistinction to continent or terra firma. The detached portions of land separated from each other, and from the larger masses or continents, by water spaces more or less wide and deep, are of two very distinct kinds. Some are elongated and generally parallel to continents, others are detached, rounded, or in groups and systems in open ocean. The former are called continental, and the latter pelagic. Of the continental islands of Europe, the British Islands, the islands between Italy and Spain, and those of the Grecian Archipelago, are the most important. As connected with Asia and Africa, Formosa, and the Japanese group, the New Zealand group, Madagascar, and the islands of the Indian Archipelago, are the most characteristic; while the West India Islands, Terra del Fuego, and the chain of islands off the N. coast of America are illustrative examples.

Island City, The, a designation of Montreal, Canada. It is built on an island of the same name.

Island No. 10, an island in the Mississippi river, at the W. extremity of Kentucky, on the border of Tennessee, about 40 miles below Columbus. It was captured by the Union forces under General Pope in April, 1862.

Island Sea, The ("Aral Tengheez"), a name given to the Sea of Aral by the Kirgheez, from the multitude of islets it contains.

Islands of the Blessed, the happy islands, supposed to lie westward in the ocean, whither after death the souls of the righteous were transported.

Islay (ī'lä), an island of Argyllshire, Scotland. Deeply indented on the S. by Loch Indal (12 by 8 miles), Islay has a maximum length and breadth of 25½ and 19 miles, and an area of 246 square miles. It contains several small freshwater lakes, and attains a height of 1,444 feet.

Isle of France. See MAURITIUS.

Isle of Man, in the Irish Channel, equidistant from England, Scotland, and Ireland. Area, 220 square miles; population (1900) 55,608. Divisions are 6 sheadings and 17 parishes. The principal towns are Douglas, Castletown, Ramsey, and Peel. Castletown is the ancient capital, but Douglas (pop. 15,719) is the chief town and the seat of government. Physical aspect mountainous, well watered, and exhibiting lovely scenery. There are peculiar breeds of ponies, cattle, cats, etc. Government is "home rule" under a lieutenant-governor, who, with council and House of Keys of 24 members, makes up the Tynwald Court. Acts, after assent of the crown, must be proclaimed on Tynwald Hill. Industries are farming, fishing, mining of lead, copper, iron, zinc, and reception of tourists. The land is in a high state of cultivation. Railways exist between the various towns. The Manx people are a distinct Celtic nationality. Their language and old customs are rapidly disappearing.

Isle of Pines (Isla de Pinos), a small island off Cuba, to which it historically belongs, though in 1900 the United States gave unofficial expression to the policy of its acquisition as a coaling station; area, about 840 square miles; pop. (1907) 3,276. It is in effect two islands connected by a marsh, the one on the N. being somewhat broken by hills, the one on the S. low, flat, and sandy. The climate is healthy, the soil fertile and the mineral resources extensive. For administrative purposes the island is a municipal district of the province of Havana.

Isle of Wight, with the exception of the Isle of Man the largest island in the English seas, lies off the S. coast of the kingdom, separated from Hampshire by the Solent, a channel mainly ranging between 2 and 4 miles in breadth, but only a mile in width on the W., between Hurst Castle and Cliff End, while it expands to 7 miles between Southsea and the Foreland on the E. In shape Wight is an elongated rhomboid, and the outline has been fancifully likened to that of a turbot. Its extreme length, E. to W. from the Foreland to the Needles, is about 23 miles, and its extreme breadth, N. to S., Cowes to St. Catharine's Point, is about 13 miles. The late Queen Victoria had a residence on the Isle of Wight. The area is calculated at 145 square miles, but was formerly estimated at much more.

Isle Perrot (ēl-per-ō'), a Canadian island in the St. Lawrence river above Montreal Island, and between Lake of Two Mountains and Lake St. Louis.

Isle Royale (-rwy-äl' or roī'al), an island belonging to Michigan, in Lake Superior, 45 miles long, 9 miles wide; area, 229 square miles. The shores are generally rocky and broken. There are extensive veins of native copper, many of which have been worked in prehistoric times, as they are still.

Isles, Lord of the, a title borne by a number of Scotch chiefs.

Ismaelites, or Ismaelians. See ISHMAELITES.

Ismail (iz'mīl), a town and river port in Russian Bessarabia; on the N. bank of the Kilia branch of the Danube, 48 miles from its mouth. Formerly a Turkish fortress, it was taken and destroyed by Suwarroff in December, 1790; came into possession of Russia in 1812; was assigned to Moldavia by the treaty of Paris, 1856, its fortifications being razed; and was transferred to Russia again by the Berlin Congress of 1878. It has an active trade in corn, wool, tallow, and hides. Pop. (1897) 31,293.

Ismailia (iz-māl'yä or iz-mä-ēl'yä), a small town on Lake Timsah, through which the Suez Canal passes. It stands on the railway from Cairo to Suez and on the Sweet Water Canal. During the construction of the canal it was the headquarters of the work, having been founded in 1863, but it is now a place of few inhabitants. The name Ismailia was also given to Gondokoro on the White Nile.

Ismail Pasha (iz'māl or iz-mä-ēl'), a Khedive of Egypt, son of Ibrahim Pasha and grandson of Mehemet Ali; born in Cairo in 1830. He was made commandant of the army in 1862, and succeeded Said Pasha as viceroy in 1863. In 1867 he acquired from the Porte the title of Khedive. His lavish expenditures not only greatly encumbered his own estate, but embarrassed all the people of Egypt. He took an active interest in the building of the Suez Canal, but under his mismanagement

the country became so involved in debt that he was forced to abdicate. This he did, his son taking his place. Not being allowed by the Sultan to go to Constantinople, he made his home at Naples and various other places for many years, but finally died in Constantinople, March 2, 1895.

Ismene (iz-mē′nē), in classic fable, a daughter of Œdipus and Jocasta. Antigone was buried alive by the order of King Creon for burying her brother Polynices, slain in combat by his brother Eteocles. Ismene declared that she had aided her sister and requested to be allowed to share the same punishment.

Ismenias (iz-mē′nē-as), a Theban musician of whom Atheas, King of the Scythians declared, "I liked the music of Ismenias better than the braying of an ass."

Isnard, Maximin (ēz-närʹ), a French orator; born in 1751. He was a Girondist in the French Revolution, and in 1793 became president of the National Convention. He died in 1830.

Isnik, a town of Asia Minor in which, in 325, the first œcumenical council was held.

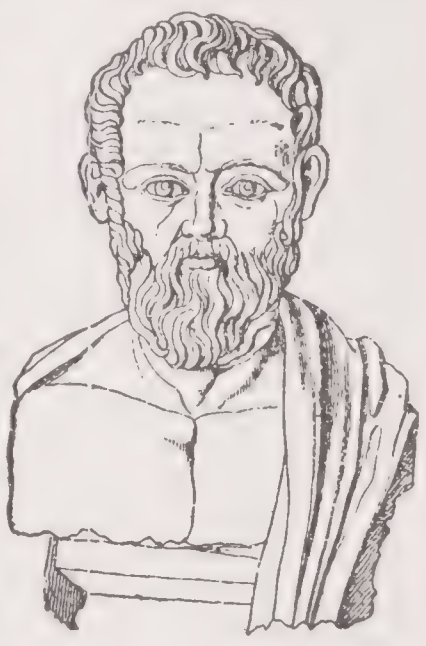
Isobaric Lines (is-ō-barʹik), lines drawn on a map or globe through all places where the barometer is at the same height at a certain time. Telegraphic communication enables these lines to be drawn with some accuracy.

Isochromatic Lines, in optics, colored rings appearing when a pencil of polarized light is transmitted along the axis of a crystal, as of mica or niter, and, after passing through a plate of tourmaline, finally reaches the eye.

Isochronism (is-ōkʹron-ism), a property appertaining to all systems in equilibrium, by which, when slightly disturbed more or less, the oscillations resulting are all performed in the same time, or so nearly in the same time that any retardation or acceleration is imperceptible. When a pendulum, for instance, is allowed to vibrate till it rests, it will be found that no perceptible difference exists between the vibrations of longer or shorter extent, the same number of vibrations being made in the same length of time. Again, in the sound produced by a musical string, the finest ear cannot detect any difference in the pitch of a note made by a smart blow on the pianoforte key and a gentle touch; yet a very small difference in the number of vibrations per second would be perceptible to the ear.

Isocrates (ī-sokʹra-tēs), a Greek orator and rhetorician; born in Athens in 436 B. C. He was carefully educated, Socrates having been of the number of his preceptors; and at an early age was celebrated for the facility with which he used his native tongue, though the weakness of his voice precluded any hope he may once have entertained of distinction in public life. He therefore opened a school of oratory, the fame of which soon filled all Greece, in consequence of the exceptional attainments of its graduates. The ages have spared to us 21 of his compositions, rhetorical and espistolary. He is best represented by the discourses known as the "Areopagiticus" and the "Panegyricus."

Isodynamic, Isoclinic, and **Isogonic Lines,** lines of equal force, equal inclination, and equal declination, are three systems of lines which being laid down on maps represent the magnetism of the globe as exhibited at the earth's surface in three classes of phenomena, the varying intensity of the force, the varying dip or inclination of the needle, and its varying declination from the true meridian.



ISOCRATES.

Isogeothermic Lines, a term introduced by Kupffer for lines drawn on a globe or map across those places in which the mean temperature of the soil is the same.

Isomerism (ī-sōmʹer-ism), in chemistry, a term applied to those bodies which are composed of the same elements in the same proportions, but which differ either in their physical characteristics or in their chemical properties. They may be divided into three distinct classes: isomeric, metameric, and polymeric bodies.

Isomeric bodies or isomerides are those which show analogous decompositions and changes when heated, or when treated with reagents, but differ in physical properties. The terpenes, $C_{10}H_{16}$, constitute the chief ingredients in the essential oils of turpentine, lemon, orange, juniper, etc. They have the same composition, and resemble each other closely in their chemical actions, but they differ in odor, boiling point, and their action on polarized light. They are true isomers, in the strict sense of the word.

Metameric bodies, or metamerides, are those which exhibit dissimilar transformations when heated or when acted on by reagents. The molecular formula, $C_3H_6O_2$, represents the three compounds, propionic acid, ethyl formate and methyl acetate. Pro-

pionic acid, a crystalline body, is converted by potash into potassium propionate; ethyl formate, a colorless, aromatic liquid, boiling at 56°, is resolved by potash into ethylic alcohol and potassium formate; while methyl acetate, a colorless, volatile liquid, is decomposed by potash into wood spirit (methylic alcohol) and an acetate. These three compounds, which are composed of the same elements in the same proportions, differ in the nature of their products when acted on by reagents, and are said to be metameric with one another.

Polymeric bodies, or polymerides, contain the same elements in the same proportions, but have different molecular weights. The most striking example is exhibited by the hydrocarbons, all of which are multiples of the lowest, namely, methene, CH_2, which, however, is not known in the free state. Thus we have ethylene, C_2H_4, propylene, C_3H_6, butylene, C_4H_8, amylene, C_5H_{10}, all of which possess the same percentage composition, but different molecular weights. All polymerides exhibit regular gradations of boiling points and vapor densities.

Isomorphism (ī-sō-mor′fizm), a general law, discovered in 1819 by Professor Mitscherlich, of Berlin, by which the variation of minerals is governed. It is that the ingredients of any single species of mineral are not absolutely fixed as to their kind and quality, but one ingredient may be replaced by an equivalent portion of some analogous ingredient. Thus in augite the lime may be in part replaced by portions of peroxide of iron, or of manganese, while the form of the crystal and the angle of the cleavage plane remain the same. These substitutions are, however, confined within certain limits.

Isonandra, in botany, a genus of *Sapotaceæ. Isonandria obovata,* an evergreen tree, growing in Tenasserim, yields a kind of gutta-percha, and *I. gutta,* the gutta-percha itself.

Isoperimetrical, in geometry, a term applied to figures which have equal circumferences or perimeters.

Isopoda (ī-sop′ō-dä), in zoölogy, an order of Crustaceans, division Thoracipoda, legion Edriophthalmia. The body is composed of seven segments, as a rule nearly equal in size. The legs, which are seven pairs, are almost of the same length. They are fitted for walking, swimming, or adhering as parasites. The posterior (abdominal) appendages are converted into leaf-like respiratory apparatus. The heart is near the tail. Professor Milne-Edwards divides the *Isopoda* into three sub-orders or sections, the cursorial, natatory, and sedentary isopods. The cursorial section includes the families *Oniscidæ Asellidæ,* and *Idotheidæ;* the natatory two, *Sphæromidæ* and *Cymothoidæ;* and the sedentary one, *Bopyridæ.* The common wood louse is a well-known example of *Isopoda.* The *Isopoda* are believed to extend from the Devonian times till now.

Isothermal Lines, lines on a globe or map passing over places in which the mean general temperature is the same. Humboldt first generalized the observations and collected the facts bearing on isothermal lines.

Isotropism, physical homogeneity or amorphism; identity of elastic forces of propagation of vibration (light, heat, sound), or identity of susceptibility to magnetization, in all directions.

Ispahan (is-pa-han′), a city of Persia, and formerly the capital of that empire. It was once so extensive and populous that the Persians said of it, "Ispahan is half the world." It is situated in the province Irak-Ajemi, of which it is the capital. The city, which was at the height of its glory during the reign of Shah Abbas in the 17th century, now presents to the observer little beyond the magnificent ruins of its former greatness. It stands in the midst of an extensive plain, abundantly watered by the Zenderood, a river about 600 feet broad; and is surrounded by groves, avenues, and spreading orchards. Within its limits the city comprises one vast succession of superb mosques, immense bazaars, marble palaces, canals, fountains, and gardens. Ispahan has within the last 50 years begun to revive from its long régime of desolation. The manufacture of all kinds of woven fabrics, from the most costly gold brocade of figured velvet to the most ordinary calico or coarse cotton, is pursued on an extensive scale; many hands are also employed in making trinkets and jewelry, paper, papier-mache goods, arms, steel sword blades, glass and earthenware. Ispahan is the chief commercial emporium of Persia, and on the great line of communication between India, Cabul, and China on the E. and Turkey, Egypt, and the Mediterranean on the W. The inhabitants are considered the best artificers in Persia, and education is very general. Ispahan, under the caliphs of Bagdad, became the capital of Irak, and under Shah Abbas the metropolis of Persia. Under this great monarch, Ispahan was a city 24 miles in circuit, and contained 160 mosques, 48 colleges, 1,800 caravanserais, 273 public baths, and 12 cemeteries, and was inhabited by 600,000 people. In 1722 Ispahan was reduced by the Appans, and in 1727 was retaken by Nadir Shah, who, however, took no steps to restore it to its ancient glory. Within the last 100 years the capital has been transferred to Teheran, and Ispahan has gradually fallen into a state of decay, from which even its commercial importance

has not been able to redeem it. Pop. (1904) est. 80,000.

Israel, the name divinely given to Jacob during the scene at Peniel or Penuel as a memorial that, as a prince, he had power with God and with men and had prevailed (Gen. xxxii: 28). Also the Jewish people; a contraction for Children of Israel or House of Israel (Hosea xi:1). See JEWS. Also a religious sect which appeared for the first time in England in 1883; in the Registrar-General's returns it is called The New and Latter House of Israel.

Israel, New and Latter House of. See JEZREELITES.

Israelites. See JEWS.

Isthmian Canal. When President Roosevelt affixed his signature to the bill passed by Congress providing for the construction of a canal across the Isthmus of Panama, "the dream of the navigator," as the building of a canal to connect the Atlantic with the Pacific Ocean has been called, gained such substance that a comparatively few years will suffice to bring it to a reality.

The thought of uniting the two oceans by means of a canal across the isthmus sprang up the moment the conviction was reached that the passage which from the days of Columbus, was thought to exist toward the Southern sea had no existence in fact. The first survey with a view to determining the feasibility of making a connection between the two oceans, however, was not carried out till 1581. In that year, in obedience to instructions, Capt. Antonio Pereira, Governor of Costa Rica, organized an expedition and explored the route by way of the San Juan river, the lake, and the rivers emptying into Gulf Nicoya, Costa Rica. Thirty-nine years later Diego de Mercado submitted to King Philip of Spain an elaborate report in favor of the construction of a canal over that route which is known as the Nicaragua route.

The Panama canal project was conceived later, and other projects were advanced later, and subsequently, also, other projects were advanced for connecting the oceans, one of which was the bold conception of James B. Eads, an American engineer, to construct at Tehuantepec a railroad which would be able to carry the largest ships from ocean to ocean. (See EADS, JAMES B.)

The scheme of connecting the two oceans has possessed a fascination for men of science and an intense interest for men of commerce ever since it was proposed. The literature on the subject is vast. On no question which ever has been before the Congress of the United States has so much been written and spoken as that of the Isthmian canal. A number of surveys of the Panama and Nicaragua routes were made during the past half century, but it may be said that not till 1879 was the first positive step taken toward the realization of the project on which so much thought had been expended. In May of that year an International Congress was convened in Paris by M. Ferdinand de Lesseps to discuss the plan of cutting a canal through the Isthmus of Panama. The Congress adopted a plan which had been prepared previously by M. de Lesseps, and immediately following that action the Panama Canal Company was formed. The company secured from Lieut. Lucien Napoleon Bonaparte Wyse of the French navy the concession which he had obtained from the United States of Colombia.

After the concession had been secured by the company, a commission, known as the De Lesseps Engineering Commission, was sent to Panama to make surveys and prepare estimates of cost. The commission estimated that a canal could be made for 843,000,000 francs. De Lesseps reduced these figures to 600,000,000 francs, or $120,000,000, and announced that a *canal a niveau*, or tide level canal, could be completed for that sum. So confident was he of the accuracy of his calculations that he invited men of prominence to attend the opening of the canal, which he set for 1888.

On Feb. 21, 1881, the first detachment of canal employes arrived at Colon. Surveys were made, and the building of camps, hospitals, and other necessary buildings followed. In 1882 the Panama Canal Company purchased the Panama railway. Interest charges accumulated between 1882 and 1888, while nothing like the progress on the canal which had been anticipated had been made. In the autumn of 1888 further borrowing became impossible, and then came a crash which shook the financial world. On Jan. 1, 1889, the company was forced into liquidation. This event created a ferment throughout France, no less than 800,000 French shareholders having been induced to invest in the stock of the company, largely through the appeals which had been made to their patriotism. A receiver was appointed by the Court of the Seine with unlimited powers. In 1890 the receiver sent a commission of French and other engineers to Panama to report on the actual condition of the work. The report was discouraging. Not more than a fifth of the proposed work had been done; a valuable plant, estimated at $30,000,000, was rusting away and useless; the tide level at Colon was filling in and the harbor was shallowing, owing to the cut.

In 1891 the government of Colombia granted to the Panama Canal Company an extension of 10 years from 1893 in which to finish the contract, provided operations were resumed before February, 1893. In November, 1892, a member of the French Chamber of Deputies, M. Delahaye, created

Isthmian Canal

a profound sensation in Paris by declaring on the floor of the Chamber that the Panama Canal Company had obtained exceptional privileges, which it had used for the purpose of defrauding investors, by the bribery of no fewer than 100 deputies. The demand for an investigation of the charges was of such force and insistence as to be irresistible, and the ministry decided to submit the whole question to a committee. Following this decision, Baron Reinach, a banker accused of being the instrument or agent of much of the corruption of the company, died suddenly, and it was alleged that he had poisoned himself. Amid a popular clamor, such as Paris had not known for many years, the investigation was carried on, and the disclosures before the investigating committee indicated that the operations of the canal company had been slimed with fraud. It was shown that the Panama Company had bribed deputies and journalists on an extensive scale in order to cover up its shortcomings and leave the way open for further imposition.

In February, 1893, M. de Lesseps, his son Charles, and some of their colleagues were sentenced to various terms of imprisonment for fraud and bribery. At the time the blow fell M. de Lesseps had passed his 80th year. Bitter as was the feeling of the French toward those who were responsible for their loss of money, much sympathy was manifested toward the man who had been the presiding genius of the great enterprise. That he had been knowingly a party to the great fraud which had wrecked the hopes and fortunes of so many worthy persons in France, the public was loath to credit. The sympathy for him took such form that he was not imprisoned. But the great engineer, who had reaped so much glory through the construction of the Suez canal, was unable to withstand the blow which the Panama exposure gave him. He died in November of the year following. At the end of 1893 the only prominent person left in prison as the result of the Panama prosecutions was M. Baihut, formerly Minister of Public Works.

In 1894 a prominent French engineer proffered a scheme by which he claimed the work could be completed in four years at an additional cost of $110,000,000. A new company was formed, and 300,000 shares were issued. Work on the canal was resumed under French auspices. Early in 1895 a strike occurred among the laborers on the canal, and the methods of the new company were criticized severely by the stockholders. Another scandal such as had attended the operations of the original company was feared, but developments showed that the suspicions were unwarranted. Nevertheless, the confidence of the French public in the ultimate success of the enterprise had been shaken to such extent as to make it manifest that the completion of the canal under French auspices was no longer a possibility.

That being the situation, those who were bound up in the enterprise turned toward America for relief. The United States up to that time had concerned itself, as far as the building of a canal was considered, solely with the Nicaragua route. The first survey for a canal at Nicaragua under American auspices was made in 1852 by Col. A. W. Childs. The project as outlined by him has been the basis for all subsequent locations. A second survey was made in 1872 by a party under the charge of Commander E. P. Lull of the United States navy. Eleven years later another survey was made by A. G. Menocal, a civil engineer, also of the United States navy. In 1889 the Maritime Canal Company was organized to construct the Nicaragua canal on the lines of the Menocal project. As there was, for a decade following, considerable enthusiasm over the Nicaragua canal scheme in the United States, the prospects of the Panama Company enlisting American capital, were anything but promising.

Nevertheless an auxiliary American company was organized. In the investigation of the French company's affairs which was made by the new American company, it was ascertained that of the $156,400,000 expended by the original company only $88,600,000 had been expended legitimately on the excavation and construction, the rest having gone in bribery and corruption. The second French company was started with a capital of 65,000,000 francs, about one-half of which was expended cautiously on construction in four years. The second French company had abandoned the original plan of constructing a tidewater canal. Its plans contemplated the construction of a canal with locks.

The history of the isthmian canal project in recent years shows that while the sentiment in favor of the construction of a canal has grown steadily, faith in the Nicaragua route as the most practicable has suffered a steady decline. This decline has been due more than anything else, perhaps, to the uncertainty of the cost of carrying out the project. The first estimate of the Maritime Company was $67,000,000. After doing more or less work on the canal the Maritime Company ceased operations in 1893 for lack of funds. In 1895 Congress appointed the Ludlow Commission to examine and report on the Maritime Company's project. This commission placed the cost of the canal's completion at $133,472,893. The Walker Commission, appointed subsequently, increased the estimate to $140,000,000.

Up to the outbreak of the war with Spain the project of constructing an isthmian canal, while acquiesced in by the

general public in the United States, had received ardent advocacy only in quarters where a special study of the subject had been made. But at the commencement of that conflict the people of the United States received an impressive object lesson on the need of a canal. That lesson was the historic trip of the battleship "Oregon." With the declaration of hostilities American attention was absorbed by the possibility of the Spanish fleet under Admiral Cervera making a sudden attack on some one of the important cities of the Atlantic coast. At that time the "Oregon," a newly constructed battleship, was on the Pacific station. It was considered desirable to have the ship added to the strength of the Atlantic fleet. Orders were sent to her commander, Captain Clark, to bring her around Cape Horn, using all speed possible. The American people watched with anxiety the famous voyage. It furnished an argument for the construction of an isthmian canal more effective than a century of discussion.

But coincident with the making up of the American mind that a canal must be built, there came the conflict of opinion as to the choice of routes. Those who were interested in the Panama enterprise were quick to see the opportunity opened to them. When the commission that was appointed by President McKinley in 1899 to examine the American isthmus at every available point in order to determine the most practicable and feasible route for a ship canal went to Paris to examine the plans of the Panama Company, the company, realizing the improbability of its being able to raise sufficient funds in France to carry the enterprise to a successful conclusion, decided to face competition with the Nicaragua project before the Congress of the United States. At a meeting of the directors it was decided to transfer all of the property of the company, its rights and powers, together with those of the American auxiliary company, to a new American company. That company was organized under the laws of the State of New Jersey, with the title of the Panama Canal Company of America. The capital was fixed at $30,000,000 and the company was authorized to increase the amount if necessary. The arrangement which it made with the French company in taking over its rights, was to pay the shareholders of that company partly in money, but mainly in shares of the American company. The French company retains only an equity in the shape of a lien on a specified percentage of the profits remaining after the payment of all operating expenses and fixed charges and a dividend to the stockholders of the new company. An international commission of French, German, Russian, English, and American engineers, consulted by the French company in drawing up its plans, estimated the cost of completing the Panama canal at $102,000,000, if the two locks were made of a certain width, and $125,000,000 if the locks were wider. The extended concession from the Colombian government runs till Oct. 31, 1910, a bonus of 3,000,000 francs having been paid to secure the extension.

After the American company was organized and the proposition for a transfer was brought definitely before the French directors, so much opposition was developed to the surrender of an enterprise that had absorbed so much French enthusiasm and entailed such sacrifices on the French people that the directors were unwilling to shoulder the responsibility of carrying out the arrangement, and all resigned. The trustees of the De Lesseps company, in particular, were reluctant to sanction the total transfer of the entire management and control from France to the United States. A new board of directors was chosen, which continued the negotiations with the American company, and the transfer was made. The legislative action by which Congress ultimately decided on the Panama canal route as the most feasible and practicable and passed the bill under which President Roosevelt was authorized to acquire the American Panama Canal Company's rights is familiar history.

The price fixed that the United States government should pay the Panama Canal Company of America for its rights and privileges was $40,000,000. With the completion of this purchase and the acquisition by treaty with the republic of Panama in 1904 of a zone of land and water 10 miles wide from ocean to ocean, the United States government had the route carefully examined by eminent American engineers and also by an international advisory board of engineers, Congress decided on a lock instead of a sea-level type of canal, and the work of construction was ultimately placed in charge of a commission, of which Col. George W. Goethals, U. S. A., was made chairman and chief engineer. The canal will be about 50 miles long; extend from deep water in the Caribbean Sea to deep water in the Pacific Ocean; and have a summit elevation of 85 feet, reached by three locks at Gatun on the Atlantic side, one at Pedro Miguel, and two at Miraflores on the Pacific side. The Gatun lake on the summit, formed by great dams at Gatun and Pedro Miguel, will have an area of 164.23 square miles. Congress voted in 1911 to fortify the canal entrances. See also PANAMA CANAL.

Isthmian Games, athletic contests of ancient Greece, celebrated in April and May of the first and third years of each Olympiad. The contests included all varieties of athletic sports as wrestling, running, boxing, etc., and competitions in music and poetry. The victors were crowned with gar-

lands of pine leaves, these being the only prize.

Isthmus, in geography, a narrow neck of land joining two larger portions, as the Isthmus of Suez and the Isthmus of Panama. The name was often employed by the ancients without any addition to designate the Isthmus of Corinth, joining the Peloponnesus to continental Hellas. Here were celebrated the Isthmian games.

Istria (is'trē-ä), an Austrian margraviate, forming a peninsula in the N. E. corner of the Adriatic Sea, between the Gulf of Trieste and the Gulf of Fiume or Quarnero. Though a mountainous land, often swept by the sirocco and bora winds, it yields excellent olive oil and wine. Area, with the adjacent islands, 1,812 square miles; pop. (1900) est. 325,000. Captial, Rovigno.

Istria, Duke of. See BESSIERES, JEAN BAPTISTE.

Isturiz, or **Isturitz, Xavier de** (ēs-tō-rēz'), a Spanish statesman; born in Cadiz, in 1790. Ferdinand VII. having rewarded his most devoted servants with exile or imprisonment, Isturiz offered his house to the malcontents, and presided at the famous rising of Riego, Jan. 1, 1820. After the establishment of the constitution, Isturiz went to Madrid, where he founded several liberal clubs. In 1823 he was elected president of the Cortes, and at the restoration, fled to London. Having been in exile condemned to death, he was amnestied by Maria Christina. He succeeded Narvaez as prime minister in 1846, was replaced by his predecessor in the following March, returning to power in April, and was dismissed by a vote of want of confidence carried by the Cortes. Isturiz, who was three times ambassador in England, signed the convention of 1861 for intervention in Mexico. He died in 1871.

Itabira (ē-tä-bē'rä), a town of Brazil, province of Minas-Geraes, on the Velhas river, about 18 miles from Ouro Preto; pop. 6,000. Also a mountain about 10 miles W. of the above town, the soil of which is said to contain a considerable proportion of gold.

Itacolumite, a schistose quartzite, containing scales of mica, talc, and chlorite, which are often so arranged as to give a certain flexibility to the rock (flexible sandstone). In Brazil and the S. E. States of North America itacolumite is the matrix in which diamonds are found.

Italian Architecture, a style founded on the old Roman orders, and the characteristic features of the ancient buildings of Rome, which may be considered to have been initiated in Italy by Brunelleschi and the Italian architects of the day in the 15th century, and brought to perfection by Palladio and other architects of eminence in the 16th century, who flourished in the times of the Medici. In buildings designed both for public and private purposes it is chiefly characterized by the use of the Roman orders of architecture, rather as decorative than constructive features. These are mainly obtained by the use of pilasters placed along the façade of each story of a building at intervals, each row of pilasters being surmounted by an entablature running along the entire length of the edifice, like a string course. When engaged columns, or columns attached to the wall, and projecting from its face to the extent of ½ or ¾ of their diameter, were used, the entablature was broken over each column, to prevent the heavy appearance that it would have presented if it had been of the same depth throughout; and this was frequently done in the case of pilasters. The cornices of the entablatures were richly ornamented. The windows and doors were decorated with pilasters or columns, rising from a massive and projecting sill and surmounted by circular, pointed, or broken pediments, on which recumbent figures were frequently placed. The roof was partially hidden by a balustrade which crowned the edifice and rose above the attic story, and the pedestals of the balustrade generally supported statues or sculptured vases. In this, and other respects, Italian architecture seems to bear some slight affinity to the architecture of the Elizabethan period; for in both styles the stories are divided by entablatures supported on pilasters, and carved ornaments are introduced on the summit of the buildings in each. Here, however, all resemblance ends, and these points of similitude are merely suggested here to show that similarity of treatment may be frequently traced in the styles of architecture prevailing in different countries at the same period; though there is no reason to suppose that the architects who have developed and perfected either styles have been influenced by the mode of treatment adopted by those who have originated the other.

Italy, a kingdom in Southern Europe, consisting in the main of a large peninsula stretching S. between the Adriatic Sea and the W. part of the Mediterranean, but also including a considerable portion of the mainland and some of the adjacent islands. It is bounded on the N. by the Alps, which separate it from Austria and Switzerland, except at the district lying to the N. of Lake Garda, where its frontier does not follow the line of the Alps; on the W. by France, from which it is separated along the larger part of the frontier line by the Graian, Cottian, and part of the Maritime Alps, and by the Mediterranean; on the S. by the Gulf of Taranto and the Mediterranean; and on the E. by the Adriatic and a portion of the Austro-Hungarian empire.

Italy

It is comprised between lat. 36° 40′ and 46° 40′ N., and between lon. 6° 35′ and 18° 35′ E. The principal islands belonging to it are Sicily and Sardinia; the others include the Lipari Islands, Capri, Ischia, Giglio, Monte Cristo, Elba, etc. Rome is the capital.

Political Divisions.— For administrative purposes the kingdom of Italy is divided into 69 provinces, which are grouped under 16 departments (*compartimenti territoriali*), some of which consist of only a single province. The provinces are subdivided into circles (in Venetia and the province of Mantua called districts). The following table furnishes a list of the provinces and departments, with the area of each, and the population on Feb. 9, 1901;

Provinces and Departments.	Area in sq. miles.	Pop. 1901.	
Alessandria	1950	812,022	
Cuneo	2882	641,172	
Novara	2553	745,357	
Torino (Turin)	3955	1,127,760	
PIEMONTE (Piedmont)	11,340		3,326,311
Genova (Genoa)	1582	935,483	
Porto Maurizio	455	145,461	
LIGURIA	2,037		1,080,944
Cagliari	5204	482,000	
Sassari	4090	307,314	
SARDINIA (Island)	9,294		789,314
Bergamo	1098	457,983	
Brescia	1845	537,690	
Como	1091	576,276	
Cremona	695	327,802	
Mantova (Mantua)	912	312,329	
Milano (Milan)	1223	1,442,767	
Pavia	1290	496,916	
Sondrio	1232	126,425	
LOMBARDIA (Lombardy)	9,386		4,278,188
Belluno	1293	191,400	
Padova (Padua)	823	443,100	
Rovigo	685	222,005	
Treviso	960	410,684	
Udine	2541	594,334	
Venezia (Venice)	934	400,030	
Verona	1188	422,355	
Vicenza	1052	446,521	
VENETIA	9,476		3,130,429
Bologna	1448	527,642	
Ferrara	1012	271,467	
Forli	725	279,072	
Modena	987	322,617	
Parma	1250	294,312	
Piacenza	954	245,049	
Ravenna	715	235,766	
Reggio nell'Emilia	876	275,827	
EMILIA	7,967		2,451,752
Acona	762	302,460	
Ascoli Piceno	796	245,883	
Macerata	1087	261,953	
Pesaro e Urbino	1118	254,453	
MARCA (The Marches)	3,763		1,064,749
Perugia	3748	644,367	
UMBRIA	3,748		644,367
Arezzo	1273	272,359	
Firenze (Florence)	2265	937,786	
Grosseto	1738	144,825	
Livorno (Leghorn)	133	124,088	
Lucca	558	318,610	
Massa e Carrara	687	195,840	
Pisa	1179	320,020	
Siena	1471	234,626	
TOSCANO (Tuscany)	9,304		2,548,154
Roma (Rome)	4663	1,206,354	
LATIUM	4,663		1,206,354
Chieti (Abruzzo Citeriore)	1138	371,293	
Teramo (Abruzzo Ulteriore I.)	1067	307,086	
Aquila (Abruzzo Ulteriore II.)	2484	397,645	
Campobasso (Molise)	1691	366,341	
ABRUZZI E MOLISE	6,380		1,442,365
Benevento	818	257,101	
Napoli (Naples)	350	1,135,906	
Salerno (Principato Citeriore)	1916	562,978	
Avellino (Principato Ulteriore)	1172	402,868	
Caserta (Terra di Lavoro)	2033	783,495	
CAMPANIA	6,289		3,142,378
Foggia (Capitanata)	2688	418,510	
Bari	2065	823,998	
Lecce (Terra d'Otranto)	2623	706,915	
APULIA	7,376		1,949,423
Potenza	3845	490,000	
BASILICATA	3,845		490,000
Cosenza (Calabria Citra)	2568	462,893	
Reggio di Calabria (Calabria Ultra I.)	1221	430,079	
Catanzaro (Calabria Ultra II.)	2030	482,788	
CALABRIA	5,819		1,375,760
Caltanisetta	1263	330,972	
Catania	1917	711,923	
Girgenti	1172	371,471	
Messina	1246	548,898	
Palermo	1948	785,016	
Siracusa (Syracuse)	1442	427,429	
Trapani	948	353,557	
SICILIA (Sicily)	9,936		3,529,266
KINGDOM OF ITALY	110,646		32,449,754
Total population in 1909			34,269,764

Italy also possesses the colony of Eritrea on the African shore of the Red Sea, and some territory in Somaliland, with total area of about 188,000 square miles, and a population of about 850,000.

Physical Features.— The length of the coast of the mainland of Italy has been estimated at about 1,450 miles, that of the islands of Sicily and Sardinia at about 850 miles; so that the whole coast line, inclusive of the smaller islands, must amount to about 2,400 miles. It is not much broken. The whole shore of the Adriatic presents a comparatively smooth and continuous line, interrupted only by the spur of Gargano, which, by its S. side, contributes to form the Gulf of Manfredonia. The largest gulf of all is that of Taranto in the S. The W. coast, though much more indented than the E., is more remarkable for the number and occasionally for the beauty of its bays than for their magnitude. Commencing at the S. extremity and proceeding N., the most important which present themselves in succession are those of St. Eufemia, Policastro, Salerno, Naples, Gaeta, and Genoa. The E. shore is generally flat and uninteresting, presenting, particularly along its N. part, a long series of sandy islands and lagoons which retard the progress of the rivers, dam up their mouths, and depriving them

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of a proper outlet occasion the formation of pestilential marshes. On the W. coast the same thing is occasionally seen, but occurs on a large scale only in the Roman territory, where the Pontine marshes, notwithstanding the proved practicability of draining them, are permitted to spread their poisonous malaria, and convert extensive tracts of great natural fertility into almost uninhabitable deserts. But with this very prominent exception, the W. coast is considerably elevated, the ramifications of the mountains often stretching down and terminating in lofty cliffs, with a magnificent background of Alpine heights. Few countries can boast of possessing scenery of this description equal to that which is exhibited by the Gulfs of Genoa and Naples

The interior of Italy is finely diversified. The loftiest mountains of the Alps stand on its N. and N. W. frontiers and shelter it from the rigors of the N., giving here a climate which, though not free from the disadvantage of an oppressive summer heat in the lower valleys and plains is unrivaled for the general mildness of its temperature and the brightness of its sky. In immediate connection with the branch of the Alps called the Maritime Alps is the chain of the Apennines, which, first proceeding E. till the Adriatic is approached, then turn S. and run down the middle of the peninsula through its whole length to the Straits of Messina; while numerous branches are thrown off laterally and form an endless succession either of loftier hills clothed with forests, or gentler slopes covered with olives and vines. In the spaces between the mountains and hills lie valleys remarkable either for their wild romantic beauties or the fertility of their soil. In the N., inclosed between the ranges of the Alps and the Apennines, is a plain of vast extent, stretching from the W. frontiers of Piedmont across Lombardy to the Adriatic, and perhaps the most fertile in Europe. Other plans attractive by their beauty occur in various parts of the peninsula.

The general fertility of Italy is intimately connected with its geological structure. Except in the ranges of the Alps in the N. and the terminating branches of the Apennines in the S., granite and the metamorphic strata, which generally form soils of little natural fertility, are not of frequent occurrence, and occupy a very limited extent of surface. On the other hand, volcanic rocks, as might be expected in a country whose volcanic agency is still active, occupy considerable tracts, particularly on the W. coasts of Naples and the Roman territory, where, by their decomposing lavas, soils of almost exhaustless fertility have been formed. The sedimentary rocks of the Italian peninsula, with exception of the metamorphic strata already referred to, are comparatively recent. At the bottom of the series is the Jura limestone, which is largely developed in the Apennines. The main body of it, commencing on the E. frontiers of Tuscany, is continued in a broad zone far S. into the old kingdom of Naples, where after a partial interruption it reappears in the S. W., chiefly in the province of Salerno, and partly in that of Potenza, and in the S. E. in the province of Bari. It also occupies a considerable space on the N. side of the Gulf of Gaeta, and on the W. slope of Mount Gargano. It is likewise the prevailing rock in the N. of Lombardy, where it stretches E. from the shore of Lake Maggiore to the Austrian province of Illyria. Above the Jurassic limestone and occupying almost an equal extent of surface, is the chalk, with its accompanying rocks. The main body of it stretches E. along the Gulf of Genoa, and N. into Emilia, then turns S. through Tuscany, forms a long narrow belt along the E. side of the main body of the Jurassic limestone, and though partially interrupted finally reaches the extremity of the peninsula, where in Cape St. Maria di Leuca, its white cliffs form the E. entrance of the Gulf of Taranto. In the N. of Naples a large tract of a somewhat oval form lies completely inclosed by the Jura limestone. The next strata in the ascending series belong to the Tertiary period, and consist of sandstones, travertin, and marl. These rocks occupy a considerable portion of Tuscany and of the central part of Piedmont between Turin and Alessandria, but receive their chief development on the E. coast, where without attaining much width they stretch without interruption from the neighborhood of Rimini to the N. W. extremity of the spur. Here the main body, spreading out, is continued S. S. E., and forms the greater part of the shore of the Gulf of Taranto. Another branch, still skirting the E. coast, reaches its extremity in the Gulf of Taranto. Above all the ancient strata now mentioned are immense diluvial and alluvial deposits, still in course of gradual augmentation. Of these, partial tracts are found both on the coast of Tuscany and the maritime provinces on the W. near Rome, particularly the Pontine marshes; but they are insignificant in comparison with the space which they occupy in the luxuriant plains of Lombardy, not only forming extensive flats along the N. shores of the Adriatic, from the Gulf of Trieste to the Gulf of Venice, but filling the greater part of the basin of the Po.

The river now mentioned is the only one of magnitude of which Italy can boast. It has the advantage of pursuing its course between the Alps and Apennines, and deriving its supplies from both of them, conveyed from the Alps by the Dora Riparia, Dora Baltea, Sesia, Ticino, Adda, Oglio, and other tributaries on the left bank of

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the river, and by the Stura on its right bank; and from the Apennines by the Trebbia, Secchia, Panaro, etc., all on its right bank. Another river of some importance, which has its mouth at no great distance from the former and is partly fed in the same way, is the Adige; and the Bacchiglione, Brenta, Piave, Livenza, and Tagliamento, which are of much less importance, have their basins in Venetia or the N. E. part of Italy, and all fall, like the Po and the Adige, into the Gulf of Venice. In the S. part of Italy, the peninsula of which it consists is not only narrow in itself, but is divided by the central chain of the Apennines into two watersheds, each of which lies so near the shore as to leave no room for the formation of large rivers. If the streams descend directly from the mountains to the shore, their course is necessarily so short as to give the character of mere torrents. It sometimes happens, however, that the mountains form parallel ridges and thus give rise to longitudinal valleys by pursuing which the course of the rivers is greatly lengthened and their volume of course augmented. In this way the Italian peninsula, notwithstanding its narrowness, has obtained the Arno, Tiber, Garigliano, and Volturno. Numerous lakes are scattered over the surface. Many of them, independent of their natural beauties, derive much interest from classical associations; and most important are Lakes Maggiore, Como, and Garda.

Climate.— The peninsula in its S. part resembles Africa more than Europe. It has the dry and burning climate of Africa, as well as the sirocco, which blows on its coasts, and resembles the simoon of that continent. In the continental part of the country the neighborhood of the Alps, the abundance of water courses, and the direction of the fine valley which opens on the Adriatic are all circumstances which serve to maintain a delightful temperature. Yet this region is at times extremely cold. The climate of Italy is generally salubrious, but there are numerous exceptions to this character. In the N. the lagoons and the rice plantations of the basin of the Po give rise to exhalations which engender fevers. In Central Italy the Maremma of Tuscany, the Campagna of Rome, the Pontine marshes, and the environs of Volturno, produce miasmata which infect the air especially during the night.

Zoölogy.— The fauna of Italy differs little from that of the other countries of Europe situated in the same latitude. Its mountains afford a retreat to the lynx, chamois, brown bear, and wolf, while among those of Sardinia is found the moufflon or wild sheep. The porcupine is very generally found in the Apennines. The pale red fox (different from the common species) and the blind mole are also found. The birds which are very numerous, comprise most of the species of Central Europe, a large number of those belonging to the E. part of Europe, and some African birds, especially the Egyptian vulture. Among the reptiles are the common viper and the asp; other noxious creatures are the scorpion and the tarantula. The marine fauna of Italy is also very comprehensive, including all the varieties of fish which are found in the Mediterranean. The fisheries embrace anchovies, sardines, tunnies, swordfish, etc. The coral polyp (among other species the madrepore) is also of economic importance, there being a large number of persons employed in the coral fishery.

Vegetation.— The natural productions of the soil of Italy are as various as its climate. In the Alpine regions all the plants belonging to cold climates flourish, while the S. regions possess a real tropical flora. Among trees are pines and firs, especially the stone pine, with edible seeds; the evergreen and other oaks, the chestnut, the poplar, etc. The olive, mulberry, fig, orange, citron, pomegranate, pistachio, jujube, and date grow in the S. and in suitable places in the N. In the extreme S. the cotton plant, sugar cane, Indian fig, agave, and other tropical plants are cultivated. Everywhere is seen the vine. The other vegetable products are common to Italy and the rest of Europe.

Agriculture.— This forms the chief support of the population, and the land is very productive in almost all parts of the kingdom, although it is not everywhere equally well cultivated. The best cultivation, aided by an excellent system of irrigation, is found in Lombardy, Venetia, Piedmont, Tuscany, and the parts of Emilia adjoining the Po. The most neglected parts are the islands of Sicily and Sardinia. About 85 per cent. of the surface of Italy is productive, and 15 per cent. unproductive. Of the productive land about 41 per cent. consists of arable land and vineyards, 21 per cent. of meadows and pastures, 5 per cent. of olive and chestnut plantations, and 18 per cent. of forests. Italy may be divided into four agricultural zones or regions: (1) the olive, orange, and citron region, embracing Sicily and Sardinia, the Neapolitan provinces except the Abruzzi, and the part of the coast of Liguria called Riviera di Ponente; (2) the region of olives and pines, embracing the Abruzzi, Umbria, Tuscany, and the part of the Ligurian coast called Riviera di Levante; (3) the vine and oak region, embracing Lombardy, Venetia except the province of Udine, the provinces of Parma, Piacenza, Modena, Novara, Alessandria, and Lomellina, now part of the province of Pavia; (4) the vine and chestnut region, comprising the two large Piedmontese provinces of Turin and Cuneo, and the province of Udine in Venetia. All

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kinds of cereals are cultivated. The wheat is of fine quality, and is chiefly used as a breadstuff by the wealthier classes, while maize and rye are principally used by the poor, who also consume great quantities of pulse and chestnuts. Among plants used in commerce and manufactures the following are grown: Hemp and madder, which are articles of export, flax, tobacco, hops, and rape in small quantities, saffron, cotton (in the level districts of the province of Salerno, and of Calabria, Sicily, and Sardinia), and sugar cane in Sicily and Sardinia. The commoner kinds of fruit trees are the objects of attention everywhere, and the cultivation of Southern fruits is carried on particularly in the Neapolitan and Sicilian provinces, and in Sardinia, and furnishes large quantities for export. Chestnuts are frequently used as a substitute for bread. In the cultivation of the olive Italy surpasses all other European States; so that, though the home consumption of olive oil is very large, there remains a considerable quantity for exportation. There is also a very large production of wine. The average annual production of some of the above mentioned objects of cultivation may be estimated as follows:

Wheat	17,800,000	qrs.
Maize	10,700,000	"
Oats	2,420,000	"
Rye and barley	2,300,000	"
Rice	3,350,000	"
Other cereals	2,250,000	"
Total cereals	39,100,000	"
Potatoes	2,420,000	qrs.
Hemp	111,000,000	lbs.
Flax	30,000,000	"
Cotton	22,000,000	"
Tobacco	7,250,000	"
Olive oil	74,500,000	galls.
Wine	666,000,000	"

On account of the celebrity which the wines of Italy anciently enjoyed, and which secured for that country the appellation of Œnotria (wine country), as well as on account of the large quantity still produced there, this department of Italian agriculture deserves a somewhat more detailed notice. In ancient times the best wines were obtained from the vineyards on the two slopes of the Apennines. From the N. to the S. this favored country produced wines of the first quality. Among the most celebrated were those of Liguria (which extended a good way further inland than the modern territory of the same name); those of Albanum (now Albano), near Rome, which became very agreeable by age, and received the warmest praises from ancient writers; those of Nomentum (Mentana), about 15 miles to the E. of Rome, which are compared by Strabo to the best wines of Greece; those of Setia (Sezze), about 35 miles to the S. E. of Rome, which were much prized by Augustus and all the wealthy Romans of his age; the Cæcuban wine, which grew in Campania, the province to the S. of Latium, and which from the earliest times held the first place among the wines of Italy, and was particularly esteemed for the exquisite delicacy of its flavor; the Falernian and Massic wines, which also grew in Campania, and likewise had a very high reputation; those of Cales and Surrentum, also grown in Campania, but reckoned inferior to those previously mentioned as grown in the same province. Besides these there were the Mamertine wine from the neighborhood of Messina in Sicily; the Sabine, Signine, etc., which were of indifferent quality; and the Vatican, and those of Veii, Caere, and other places, which were considered the worst. The S. W. of Sicily, which now produces excellent wines, is nowhere mentioned for its wine-growing qualities in the writings of the ancients. At the present day the wines of Italy are admittedly inferior to their ancient reputation. On this a French writer remarks that "while the inhabitants of less favored countries employ their industry in selecting the best shoots and protecting them from the intemperance of all seasons, the Italians, accustomed to see the vine grow almost spontaneously and everywhere bear fruit which attains complete maturity, do not seek to improve the advantages of their situation, and sure of a sufficient vintage neglect this plant even in those districts where the quality of its products invites some care. The vines yield many wines, among which the liqueur wines are distinguished for their good quality; but those which serve for daily use cannot enter into competition with those of France. The most of them are at once sweet and harsh, often coarse, and although they appear to combine much body and strength they do not easily bear transport, and deteriorate in little time, even without being removed to a distance. Their bad quality proceeds not only from the want of care shown in the cultivation of the vines, but also from the bad processes employed in the manufacture." Among the liqueur wines which are so abundant in Italy may be mentioned the lachrymæ Christi, nasco, giro, tinto, Malmsey, aleatico, and muscat. The most famous of the Italian red wines are those of Carmignano in Tuscany, and those of the Isle of Elba, Bari, and Ischia. The white wines of Marsala and Castel-Veterano are compared to Madeiras of the second class.

The rearing of live-stock is an important industry in Italy, which exports cattle, sheep, goats, and swine. Horses are imported, and also sheep's wool. The cultivation of green crops as food for cattle is scarcely known. During the summer the animals are led to the pastures and in winter they are furnished with straw and a little hay in their stalls. The farmers do not give much attention to the improvement of their domestic animals, which have

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lost much of their original excellence. The cattle are estimated to number about 5,000,000 (including 15,000 buffaloes), many of them team oxen. Sheep number 6,900,000. Some camels are perfectly acclimated near Pisa in the low-lying tracts of San Rossore. The cheese of Italy is famous, especially the Parmesan. The timber obtained from the woods is not sufficient to meet the home demand.

Manufactures.—Since the consolidation of the Italian kingdom the manufactures of the country have made considerable advances, especially in the department of Tuscany and the Northern provinces. They now afford support to 13 per cent. of the whole population. Machine making, although not sufficing to meet the internal wants of the country, nevertheless employs many workmen, especially in Genoa and neighborhood, Turin, Milan, and Naples. Coach and carriage making is an important industry in Milan. As respects shipbuilding Italy takes a respectable place among the maritime countries of Europe; it is most largely carried on in Liguria. Musical instruments are made in all the capitals. Especially famous are the bow instruments of Cremona, and nowhere are violin strings made so well as in the Abruzzi. In the iron industry the department of Lombardy stands at the head; and in that department more particularly the provinces of Brescia, Como, and Milan. The town of Bresci is the chief seat of the cutlery manufactures in Italy. The manufacture of gold and silver wares is very flourishing in Rome, Milan, Naples, Genoa, Venice, and Catania, and like that of articles in bronze has long been an important branch of Italian manufacturing industry. Italy is very rich in marble of the most beautiful and various colors and markings. The department most celebrated in this respect is Tuscany, especially the province of Massa e Carrara, and the district of Serravezza in the province of Lucca. The district of Volterra in the province of Pisa is noted for its alabaster quarries and the making of articles in alabaster. The cities of Rome, Naples, and Florence enjoy a world-wide reputation for their cameos and mosaics, as also (along with Leghorn and Genoa) for articles of coral.

Earthenware manufactures have long been carried on in Italy with the best success. The articles in terra cotta especially are remarkable for the beauty of their forms. Venice and the neighboring island of Murano are celebrated for the manufacture of glass beads, but the other glass manufactures of Italy do not nearly suffice for the home consumption. In the department of chemical industries the production of boracic acid (obtained from the lagoons of Tuscany) and of tartaric and citric acids, the manufacture of soap (of great consequence in Venice), and the preparation of alizarin or madder red at the mouth of the Sarno, may be particularly mentioned. Among articles used for meat or drink, pickled meat and sausages (which are exported to a considerable extent), and liqueurs and rosolios, are the most important which are made in Italy. The sugar industry holds a very subordinate place, as does also the brewing of beer. The manufacture of tobacco is a State monopoly, and employs about 15,000 hands. The spinning and weaving industries in Italy are in some branches very highly developed. The most important of these are the silk manufactures, which form one of the chief sources of the national wealth. With the exception of Abruzzi, Basilicata, and the island of Sardinia, all the provinces of the kingdom take part in the preparation of the raw silk which is used in the manufacture, but this is more especially the case in Lombardy, Piedmont, and Venetia.

The rearing of silkworms is more largely carried on in Italy than in any other country in Europe. Over 2,000,000 spindles are employed in spinning the silk, and the weaving is a very extensive branch of manufacture in Como, Genoa, Caserta, Milan, Turin, Florence, and Naples. Silk industries employ over 170,000 hands. The cotton manufacture is, as a textile industry, next to that of silk, and has greatly increased in recent years, the factories being chiefly in Lombardy, Piedmont, Lucca, and the Genoese district. About 1,900,000 spindles are now employed, the number of hands being 80,000. Woolen manufactures are chiefly carried on in Upper Italy, in Piedmont and Venetia, in the provinces of Novara, Vicenza, and Turin. The number of spindles at work is about 345,000, the looms about 9,000 (half being power looms), the hands employed about 28,000. The import of woolen yarns, and still more so of woolen fabrics, is large. Flax, hemp, and jute support industries of some importance. Hand-spinning is general where the raw material is grown. Good fabrics are woven, though they are not able to compete with those made in England, France, Germany, and Austria. Hempen fabrics which are chiefly produced in the provinces of Bologna and Ferrara, where ropemaking also plays an important part, are articles of export. Tanning is carried on in almost every part of the peninsula. There are in several places, but chiefly Genoa and Naples, factories for the making of gloves, boots, and shoes, which are of excellent quality, and exported to various countries, and even to America. The paper manufacture is very flourishing, and great advances have been made in the processes employed. In the making of straw hats and other articles

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in plaited straw Italy maintains the first place among the countries of Europe. The chief seat of this industry is in Tuscany (especially Florence and its environs), where it supports a great number of persons. The products of this manufacture are known all over the world. The making of furniture, and of articles of turnery, and articles used for personal adornment, as well as the manufacture of felt and silk hats, may be mentioned among the other manufacturing industries carried on in Italy.

Commerce, Shipping, and Banks.— The foreign trade of Italy is not on the whole large in proportion to the size and population of the country, and is not making much progress. In 1882, 1889, and 1900 the imports and exports reached the following figures:

	1882.	1889.	1900.
Imports	£53,816,000	£55,646,000	£68,259,185
Exports ...	46,232,000	38,026,000	54,195,984

Among the chief imports are coal, grain, cotton, silk, wool, sugar, coffee; by far the largest export is silk, raw and thrown, others being wine, olive oil, oranges and lemons, hemp and flax, sulphur. In 1900 the import of coal reached the value of £8,311,262; of raw cotton £6,036,323; cotton goods, £584,422; of silk, raw, twisted, etc., £6,451,738; of machinery, £3,101,811. In the same year the exports of silk and silk goods were valued at £18,033,647 (as against £20,810,735 in 1899); of animals and animal products at £6,838,558; of wine at £2,519,296; olive oil, £1,138,120; fruit, £2,190,338. The trade of Italy is chiefly with France, the United Kingdom, Germany, Austria, Switzerland, Russia, and the United States. In 1899 the imports from France amounted to fully £6,000,000; from the United Kingdom, to nearly £12,000,000; and from Germany, to nearly £8,000,000; in the same year the exports to France amounted to fully £8,000,000; to the United Kingdom, to nearly £6,000,000; and to Germany, to £9,400,000. The chief exports from Italy to the United Kingdom include olive oil, hemp, and fruits, and the principal imports from the United Kingdom are coal, machinery, metals, wool, and woolens.

In the year 1899 the merchant marine of Italy consisted of 6,148 sailing and steam vessels, of 815,162 tons burden, the steamers being of 277,520 tons burden, these figures including vessels engaged in the coasting trade and in fishing from 1 ton burden upward. The total tonnage entered at Italian ports in 1899 amounted to 30,307,515 tons; cleared, 30,162,879 tons. The principal ports are Genoa, Leghorn, Messina, Naples, Palermo, Venice, and Catania, Genoa standing first and Naples second.

There are now only three banks of issue in Italy. The chief of these is the Bank of Italy, formed by the union of the National Bank of the Kingdom of Italy, founded in 1850, with a share capital of £8,000,000, and having its chief seats in Florence. Genoa, Milan, Naples, Palermo, Rome, Turin, and Venice; with the National Bank of Tuscany, founded in 1857, share capital £2,000,000; and the Tuscan Credit Bank, founded in 1860, share capital £2,400,000. The other two banks of issue are the Bank of Naples, founded in the 16th century; and the Bank of Sicily, founded in 1843; chief seats, Palermo and Messina.

Railways, Telegraphs, and Postoffice.— The length of the railways in operation, including Sicily and Sardinia, is now about 10,000 miles, of which considerably more than half belong to the State. The first line of railway was opened in 1839, but the process of construction was for a long time slow. In recent years the State has engaged in constructing railways and has also obtained possession of others by purchase, but all are now worked by private companies. It is expected that when all the lines undertaken by the government have been completed, the total cost of construction will have amounted to 5,000,000,000 lire, or £200,000,000. The receipts of the Italian railways in 1875 were £5,792,771; in 1880, £7,204,280; in 1898, over £11,000,000.

The total length of the telegraph lines in operation in the kingdom is over 25,000 miles, most of which belong to the State. The total number of inland dispatches amount to between 7,000,000 and 8,000,000 annually. The postoffice in the course of the year now transmits considerably more than 250,000,000 letters and postcards. The number of postoffices in the kingdom, including collecting boxes, is stated to be over 7,700.

Constitution and Government.— The constitution of the kingdom of Italy is a limited monarchy. It is based on the fundamental statute of March 4, 1848, fixing that of the kingdom of Sardinia. The throne is hereditary in the male line of the royal house of Savoy. The king attains his majority on completing his 18th year. He exercises the power of legislation only in conjunction with a National Parliament, consisting of two chambers. The first chamber is called the senate, and is composed of the princes of the blood, and an indefinite number of members appointed for life by the king. These last must be above 40 years of age, and must be distinguished either by holding or having held some high office either in Church or State, or by eminent services in literature, science, art, or any other pursuit tending to the benefit of the nation, or they must have paid for at least three years a sum not less than 3,000 lire (£120) in direct taxes. At present the senate numbers

about 334 members. The second chamber is called the chamber of deputies, and consists of 508 members, who are elected by a majority of all the citizens above 21 years of age who are in the enjoyment of civil and political rights, can read and write, and who pay direct taxes to the State or the provincial administration to the amount of 20 lire (1 lira = 19.3 cents) yearly. Certain persons enjoy the franchise independently of the taxation test, such as members of learned academies and of chambers of commerce, professors, State officials, members of knightly orders, doctors, advocates, etc. For the election of the members of the chamber of deputies the whole country is divided into electoral colleges or districts. Any one who has the right of voting and has completed his 30th year may be elected, unless he be a clergyman or an officer of State. Some officers of State, however, may be elected. The king calls the chambers together every year. The sittings are public. The president of the senate is appointed by the king, that of the chamber of deputies is elected by the chamber itself. The chamber of deputies has the right of impeaching ministers of the crown, in which case the senate is the court before which the impeachment is tried. The constitution of the provinces and communes is based on the law of March 20, 1865. Each province has the right of independent administration, and the executive power is intrusted to a provincial council, the members of which are elected by the communal electors for five years, and to a provincial deputation or commission elected by the council from its own members, and managing the business of the province when the council is not sitting. The provincial councils elect their own presidents and other officials. In each commune there is a communal council elected like that of the provinces for five years, and a municipal giunta elected by the council. The head of the communal administration is the *sindaco*, who in all the chief communes is elected by the council from among its own members, and in other cases is nominated by the king from the members of the communal council.

The executive power of the State is exercised by the king through responsible ministers forming a council of ministers. In addition to this there is a State Council possessing consultative powers, and authorized to decide on questions of competence arising between the administrative departments and the law courts, as well as in cases of dispute between the State and its creditors. There are 11 departments in the government: (1) the ministry of foreign affairs, to which is attached the diplomatic council; (2) the ministry of the interior, with the supreme sanitary council, and the command of the national guard; (3) the ministry of justice and ecclesiastical affairs; (4) the ministry of finance, with the permanent council of finance; (5) the ministry of the treasury; (6) the ministry of war; (7) the ministry of marine, with the supreme council for naval affairs; (8) the ministry of public instruction, with the supreme council of instruction; (9) the ministry of public works, with the supreme council for public works; (10) the ministry of agriculture, manufactures, and commerce, with the councils for trade and manufactures, agriculture, mines, and woods and forests; and (11) the ministry of posts and telegraphs. The court of accounts of the kingdom of Italy occupies an independent position. For the administration of the law there are, besides numerous courts of first instance, 161 civil tribunals and the tribunals of correction, 92 assize courts, 24 courts of appeal, and 4 courts of cassation (at Turin, Florence, Naples, and Rome).

Finances.— The finances of Italy are not in a satisfactory condition, this being due partly to the expensive wars which were necessary in order to establish and consolidate the unity of the kingdom, partly to the increase of the public debt in consequence of the successive annexations of different portions of the Italian territory, since the present kingdom of Italy has naturally inherited the debt of each of the separate States of which it was formed, partly to the large sums expended on railways and on the army and navy. At the end of 1874 the nominal capital of the whole Italian debt was valued at a sum equal to £395,343,569. In the year 1894 the total debt was estimated to have increased to about £474,500,000. The difficulty experienced by the government in raising money to meet all its obligations has impelled it to resort to means which are in some cases extremely oppressive and unpopular (such as the grist tax), and in other cases scarcely creditable (State lotteries). The Italian budget divides the revenue and expenditure into ordinary and extraordinary. According to the budget of 1900–1901 the total revenue estimated for that year was £69,056,870, and the total expenditure £69,212,500. For a number of years following the establishment of the kingdom (1861) the expenditure generally exceeded the revenue, the deficit rising in one year (1866) to £24,680,000. From that date the deficit decreased steadily, and 1884–1885 showed a surplus of £1,400,000. Such a surplus, however, is rare, that for 1898–1899 being £399,918. The progressive increase of the receipts to balance the expenditure is mainly due to two causes, the establishment of new taxes and the more careful collection of the old ones. Besides the general budget there is one for communes and another for provinces, both

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of which show, if not an altogether satisfactory state, at least an improvement.

Army and Navy.— By the law of June 7, 1875, supplemented by subsequent enactments, all men capable of bearing arms are under obligation of military service from the end of their 20th to the end of their 39th year. The forces are divided into three main branches: the standing army, the mobile militia, and the territorial militia. The regular time of service for the infantry is two or three years with the flag, six or five years in the reserve, three or four years in the mobile militia, and seven years in the territorial militia. The cavalry serve three years with the flag, six years in the reserve, and ten in the territorial militia. A certain number of the annual recruits (decided by the ballot) are only called on to serve under the flag from two to six months, which may be spread over several years. A third category have to engage in military exercises for only 30 days during the 19 years. The whole kingdom is formed into 12 military districts, each with an army corps. In 1900 the permanent standing army numbered in all 851,164, of whom 257,615 were actually serving with the flag. Of the latter 170,127 were infantry, 25,106 cavalry, and 29,365 artillery. The mobile militia numbered 304,497, the territorial militia 2,106,233. The total army strength was 3,261,984.

Great efforts have been made to strengthen the fleet in recent years, and it now possesses some powerful vessels. There are 13 battleships of the first class, two of which, the "Duilio" and "Dandolo," have their citadel armor 22 inches in thickness. These are reputed to be among the most powerful warships yet constructed, each carrying four 100-ton Armstrong guns. Three others carry 105-ton guns.

Ecclesiastical Affairs.— According to the provisions of the fundamental statute the Roman Catholic is the State religion, but all other creeds are tolerated, and adherents of all religions have equal municipal and political rights. The spiritual head of the Roman Catholic Church, the Pope, has his seat in Rome. His prerogatives are regulated by the law of May 13, 1871, which also determines the relation between Church and State. By this law the person of the Pope is pronounced sacred and inviolable. The Italian government pays sovereign honors to the Pope, and guarantees him a yearly dotation of 1,225,000 lire (£129,000). The Pope also enjoys the possession of the palaces of the Vatican and the Lateran, and the villa of Castel Gandolfo, without being subject to taxes on their account, and these places are not put under the jurisdiction of the State. Temporary residences of the Pope, as well as places where a conclave or a council is held, are protected by similar immunities. The Pope is perfectly free in the exercise of his spiritual functions; and free intercourse is also guaranteed between the head of the Church and the episcopate, as well as the whole Catholic world. The ambassadors of the Pope, and those accredited to the holy see by foreign powers, enjoy all the privileges granted to such functionaries by international usage. The Church has the entire right of nominating to all ecclesiastical offices and benefices. The royal *exequatur* and *placet* are abolished. This guarantee law, as it is called, which really determines the relations between Church and State at the present day, has never been acknowledged by any of the Popes. In the kingdom of Italy there are 51 archbishoprics and 223 bishoprics, besides 6 cardinal bishops with sees in Italy. The number of parish priests is about 76,500. The monasteries and convents have been abolished by a royal decree dated July 7, 1866, and extended to the former Papal States and to Rome itself by another decree dated June 25, 1873. Among the Waldenses, who follow the religious observances of the Reformed Church, the highest spiritual authority is confided to a synod.

Education.— Compulsory education is enforced by the law of July 15, 1877, for all children who have completed their sixth year, and do not receive adequate instruction either at their homes or in private schools. Attendance is obligatory at the rudimentary schools in the commune for such children up to their ninth year, and in case of failure to pass the requisite examination they may be detained a year longer. The elementary communal schools are entirely supported by the municipalities, which nominate and pay the teachers, and carry out the educational laws under the supervision of the state school inspectors. The subjects of compulsory instruction are reading, writing, arithmetic, the metric system, the rudiments of Latin, and the first duties of a man and a citizen. Religious instruction is not obligatory. There are many schools supported by the Church, as well as private schools, but all must adopt the government code, and are open to government inspection, while all teachers must hold the government certificate. The urgency of the need for all practicable measures being used to advance the cause of popular education in Italy may be gathered from a return issued by the Italian government in March, 1870, which gives information regarding the amount of education received by the military conscripts born in 1847, and called up for active service in 1868, and shows that throughout the kingdom of Italy the average percentage, reckoned over the different provinces of the kingdom, of these conscripts who were totally unable to read or write was 64.27. In the province of Girgenti it was 85.82,

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and in the Southern provinces generally it was above 80. The average percentage by 1897 had decreased to little more than 37. It is now comparatively rare to meet a boy or girl who cannot at least read. Education is practically free up to the university.

Besides the regular day schools there are evening schools, in which elementary education may be carried further. The principal institutions for secondary education are the gymnasiums and lyceums, the former having a course of five years, the branches taught being Greek, Latin, Italian, history, geography, and arithmetic; the latter, having a course of three years, add to these subjects philosophy, mathematics, physics, chemistry, and natural history. No fees are charged either in gymnasium or lyceum. In addition to these there are a number of technical schools, in which fees are charged. There are also schools of agriculture, mining, commercial education, etc. For the higher education there are no less than 21 universities, many of them of ancient foundation, and at one time of considerable renown. The oldest are those of Bologna (founded in 1119), Padua (1222), Naples (1224), Rome (1244), Perugia (1320), Pisa (1329), Siena (1349), Pavia (1390), Turin (1412), and Parma (1422). The other universities are Cagliari, Camerino, Catania, Ferrara, Genoa, Macerata, Messina, Modena, Palermo, Sassari, and Urbino. The number of students at all the universities was returned in 1897–1898 at 22,540, of whom Naples had 5,465, Turin 2,551, and Rome 2,300. In all universities the theological faculty has been abolished. Coöperating with these institutions for the education of the people there are about 150 training schools for teachers, with an attendance of about 18,000 students. There are government art schools at Bologna, Carrara, Florence, Lucca, Milan, Modena, Parma, Ravenna, Rome, Turin, Venice, etc., with a total of 3,300 pupils; and in addition, the academies of Genoa, Bergamo, Verona, Siena, Pisa, and Perugia. Musical conservatories are supported by the government at Florence, Milan, Naples, Palermo, and Parma.

Money, Weights, and Measures.—The present monetary system of Italy is the same as that of France, the lira being equal to the franc, and divided into 100 centesimi, as the franc is into 100 centimes. The lira is accordingly equal to about 9½*d*. The weights and measures of Italy have also been adopted from France, and in their case the names also have been adopted, with only such modifications as are necessary to give them an Italian form. Thus the Italian gramma = the French gram, the chilogramma = the kilogram, the litro = the liter, the ettolitro = the hectoliter, and so on; the metro = the meter, the ettometro = the hectometer, the chilometro = the kilometer, etc.; the aro = the are, the ettaro = the hectare; and the stero = the stere, and the decastero = the decastere. The quintale metrico is the same as the quintal metrique, and the tonelata the same as the tonneau metrique. (See METRIC SYSTEM.)

HISTORY.—Italia did not become the general name of this country till the age of Augustus. It was known to the Greeks under the name of Hesperia, and also, either in whole or part, by those of Ausonia, Saturnia, and Œnotria. The name of Italia was at first merely a partial name for the S. extremity. From the earliest times Italy was inhabited by many tribes of different origin. The region on both sides of the Po (Padus) in Upper Italy was inhabited by a Gallic race, divided into numerous tribes and States possessing a number of towns on the coast as well as on the fruitful plain in the interior. Adjoining them on the N. E. were the Venetians, and on the W. coast the Ligurians. Central Italy was the seat of several races which had partly been settled in the land from time immemorial, and were thence regarded as aborigines, and had partly immigrated from foreign countries. Among the former were the Sabellians, a powerful, warlike, freedom-loving people, subdivided into various tribes, the chief of whom were the Sabines, Samnites, and Æquians; the Umbrians, who dwelt to the N. of the Sabellians, and are considered by scholars to be the most ancient of all the races inhabiting Italy; the Latin tribes, living to the W. of the Samnites in the region called, from them, Latium; and the Oscans, Opicans, or Ausonians, living further S. than the Latins, being the earliest inhabitants of Campania. Among the latter races who came into Italy from foreign countries, the most remarkable were the Etruscans who dwelt between the Gauls in the N., the Umbrians, the Latins, and the sea. Lower Italy was occupied by Apulians in the S. E., supposed to be members of the Oscan race, and by Lucanians, a Labellian tribe; and the Brutii in the S. W., the former occupying the district to the S. of Campania and Samnium, and extending as far as the root of the small peninsula in the extreme S. W., which was the habitation of the latter. The coasts of Lower Italy as far N. as Latium were studded many hundred years before Christ with Greek colonies, from whom the neighboring tribes derived some of the elements of Greek culture and an acquaintance with Greek mythology. Evidence of this is found in the Latin legend to the effect that after the destruction of Troy the hero Æneas, with a number of Trojan followers, came to Italy and formed a settlement in Latium, where he married the daughter of the Latin king. At an

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early period in Italian history Rome, the chief town of Latium (founded, according to the received date, 753 B. C.), became predominant among the cities and tribes of Central Italy, and it gradually extended its influence over the whole country until, by the end of the 3d century B. C., it had brought into allegiance or subjection all the tribes of Italy from N. to S., including those of the islands of Sicily, Corsica, and Sardinia. The history of ancient Italy thus merges to a great extent in that of Rome, to which article, as well as those treating of the more important races of Italy, the reader is referred for further information concerning ancient Italy, while we here take up the thread again with the overthrow of the empire in the West, A. D. 476.

First Period. From Odoacer to Alboin (476–568).— This period comprises the time of the dominion of the Herulians and Rugians, and of the Ostrogothic kingdom. Shortly after the beginning of the reign of the Emperor Romulus Augustulus, the Germanic troops, Herulians and others, in the Roman pay, demanded for themselves a third part of the territory of Italy; and when the demand was refused Odoacer, their leader, dethroned the powerless emperor, and assumed the title of King of Italy. For 12 years this valiant barbarian ruled, not without fame, when Theodoric, King of the Ostrogoths, instigated by Zeno, Emperor of the East, marched at the head of 200,000 men bearing arms, accompanied by their wives and families and all their movable possessions, from their seats on the Danube into Italy (488). After defeating Odoacer at Verona (489) and shutting him up in Ravenna, he obliged him to surrender after a brave defense which lasted for three years, and not long after he was slain by the Goths at a tumultuous banquet (493). Thenceforward Theodoric ruled over Italy with Ravenna as his capital. His Goths spread from the Alps to Sicily. In the lagoons of the Adriatic alone some fugitives who had fled from the devastations of Attila, and obtained a subsistence as sailors and by the manufacture of salt, maintained their freedom. Theodoric, who combined the vigor of the N. with the cultivation of the S., is justly termed the Great, and, under the name of Dietrich of Bern (Verona), has become one of the principal heroes of old German story. But the energy of his people soon yielded to Roman corruption. Totilas for 10 years in vain endeavored to maintain the almost completed conquest against the military skill of Belisarius and Narses, the generals of the Byzantine Emperor Justinian. He fell in battle in 552, and Teias, his successor, in 553; after which Italy was annexed to the Eastern empire, under an exarch who resided at Ravenna. But not many years after, the country was invaded by the Lombards (Langobardi, Longobardi), a German people who had emigrated from the Elbe to Panonia. Under King Alboin they conquered the Po basin, which received from them the name of Lombardy, almost without a blow (568), and founded a kingdom which had its capital at Pavia. Their government was less favorable to the arts and sciences than that of the Goths.

Second Period. From Alboin to Charlemagne (774), or Period of the Lombard Empire.— The kingdom of the Lombards included Upper Italy, Tuscany, and Umbria. Alboin also created the duchy of Benevento, in Lower Italy, with which he invested Zotto. The whole of Lombardian Italy was divided into 30 great fiefs, under dukes, counts, etc., which soon became hereditary. Together with the new kingdom, the confederation of the fugitives in the lagoons still subsisted in undisturbed freedom. The islanders, by the election of their first doge, Anafesto, in 697, established a central government, and the republic of Venice was founded. (See VENICE.) Ravenna, the seat of the exarch, with Romagna, the Pentapolis, or the five maritime cities (Rimini, Pisaro, Fano, Sinigaglia, and Ancona), and almost all the coasts of Lower Italy, where Amalfi and Gaeta had dukes of their own, of the Greek nation, remained unconquered, together with Sicily and the capital, Rome, which was governed by a patrician in the name of the emperor. The slight dependence on the court of Byzantium disappeared almost entirely in the beginning of the 8th century, where Leo the Isaurian exasperated the orthodox Italians by his attack on images. (See ICONOCLASTS.) The cities expelled his officers, and chose consuls and a senate, as in ancient times. Rome acknowledged, not indeed the power, but a certain paternal authority of its bishops, even in secular affairs, in consequence of the respect which their holiness procured them. The Popes, in their efforts to defend the freedom of Rome against the Lombards, forsaken by the court of Byzantium, generally had recourse to the Frankish kings. In consideration of the aid expected against King Astolphus, Pope Stephen III. (754) not only anointed Pepin, who, with the approbation of Pope Zacharias, had been made King of the Franks in 752, but, with the assent of the municipality of Rome, appointed him patrician, as the imperial governor had hitherto been denominated. In 756 Pepin presented the exarchate of Ravenna, with the five cities, to the Pope, thus laying the foundation of the temporal power of the holy see. At the invitation of Pope Hadrian I. Charlemagne made war on Desiderius, King of the Lombards, took him prisoner in his capital, Pavia, and united his empire with the Frankish monarchy (774).

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Third Period. From Charlemagne to Otho the Great (961), or Period of the Carlovingians and Interregnum.—The attempts of Charlemagne against the duchy of Benevento, the independence of which was maintained by Duke Arichis, and against the republics in Lower Italy, where Naples, Amalfi, and Gaeta in particular, had become rich by navigation and commerce, were unsuccessful. Leo III. bestowed on the King of the Franks, on Christmas day, A. D. 800, the imperial crown of the West, which needed a Charlemagne to raise it from nothing. But dislike to the Franks, whose conquest was looked on as a new invasion of barbarity, united the free cities, Rome excepted, more closely to the Eastern empire. Even during the lifetime of Charlemagne, Frankish Italy was given to his grandson Bernard (810). But Bernard having attempted to become independent of his uncle, Louis the Debonnaire, he was deprived of the crown, and his eyes were torn out. Italy now remained a constituent part of the Frankish monarchy, till the partition of Verdun (843), when it was allotted, with the imperial dignity, and what was afterward called Lorraine, to Lothaire I., eldest son of Louis I. Lothaire left the government (850) to his son Louis II., the most estimable of the Italian princes of the Carlovingian line. After his death (875) Italy became the apple of discord to the whole family. Charles the Bald of France first took possession of it, and after his death (877) Carloman, who was succeeded in 844 by his brother Charles the Fat, who united the whole Frankish monarchy for the last time. His dethronement (887) was the epoch of anarchy and civil war in Italy. Berengarius, Duke of Friuli, and Guido, Duke of Spoleto (besides the Marquis of Ivrea, the only ones remaining of the 30 great vassals) disputed the crown between them. Guido was crowned king and emperor, and after his death (894) his son Lambert, though Berengarius got himself crowned king in the same year. Arnulf, the Carlovingian king of the Germans, enforced his claims to the royal and imperial crown of Italy (896), but, like most of his successors, was able to maintain them only during his residence in the country. After the death of Lambert (898) and Arnulf (899) the struggle for supremacy in Italy still continued, the competitors now being Berengarius, of Friuli, and Louis, King of Lower Burgundy (Arles), but at last the former succeeded in restoring quiet by driving out his rival. In 915 he was crowned emperor, with which title he reigned till 924, when he was assassinated. At the time that this happened Rudolph II., King of Upper Burgundy, was engaged, on the invitation of the Lombards, in an expedition into Italy for the purpose of dethroning Berengarius, but soon after (926) he was induced to relinquish his claims to Italy in favor of Hugh of Province, who seems to have agreed to cede in return to Rudolph his kingdom of Arles. Hugh sought to strengthen the insecure throne of Italy by a bloody tyranny. His nephew, Berengarius, Marquis of Ivrea, fled from his snares to Otho the Great of Germany, assembled an army of fugitives, returned, and overthrew Hugh (945), who was succeeded by his son Lothaire. Berengarius became his first counsellor, but was more bent on gratifying his ambition than on securing the welfare of the country. After the death of Lothaire in 950 (poisoned, it was said, by Berengarius), the latter wished to compel his widow — the beautiful Adelaide — contrary to her inclination, to marry his son. Escaping from his cruelty she took refuge in the castle of Carossa, where she was besieged by Berengarius II. She then applied for aid to Otho I., King of Germany, who passed the Alps, liberated her, conquered Pavia, became King of the Franks and Lombards (in 951), and married Adelaide. To a prompt submission, and the cession of Friuli, the key of Italy, which Otho gave to his brother Henry, Berengarius was indebted for permission to reign as the vassal of Otho. But, the nobles of Italy preferring new complaints against him, 10 years after, Otho returned (961), deposed him, and led him prisoner to Bamberg, and after having been himself crowned King of Italy with the iron crown, in 961, united this kingdom with the German. Early in the following year (962) he was crowned emperor by Pope John XII., and from this event dates the foundation of what is know in history as the Holy Roman empire.

Otho gave the great imperial fiefs to Germans, and granted to the Italian cities privileges that were the foundation of a free constitution, for which they soon became ripe. The growing wealth of the papal court, owing to the munificence of the French kings, which had promoted their influence on the government, so beneficial under Leo IV. and Popes of a similar character, became, through the corruption of the Roman court in the 10th century, the first cause of its decline. The clergy and the people elected the Popes according to the will of the counsels and a few patricians. In the first half of the 10th century two women disposed of the holy chair. Theodora elevated (913 or 914) her lover John X., and Marozia, the daughter of Theodora, in 931, elevated her son, John XI., to the papal dignity. The brother of the latter, Alberic of Camerino, and his son Octavian, were absolute masters of Rome, and the last was Pope, under the name of John XII., when 20 years of age (956). Otho the Great, whom he had

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crowned emperor, deposed him, and chose Leo VIII. in his stead; but the people, jealous of its right of election, chose Benedict V. From this time the Popes, instead of ruling the people of Rome, became dependent on them. In Lower Italy the republics of Naples, Gaeta, and Amalfi still defended their independence against the Lombard duchy of Benevento, with the more ease, as the duchy had been divided (839) between Siconolphus of Salerno and Radelghisius of Benevento, and subsequently among a greater number, and as the dukes and they had had a common enemy in the Saracens who had settled and maintained themselves in Apulia. But about 40 years later the Greeks in Lower Italy, who had hitherto adhered to the Byzantine empire, succeeded, with the aid of Louis II. of Germany, in recovering the territory that had been wrested from them by the Saracens, and out of the recovered region formed a separate province, called the Thema of Lombardy, which continued under their dominion upward of 100 years, being governed by a catapan (governor-general) at Bari. Otho the Great himself did not succeed in driving them altogether from Italy. The marriage of his son Otho II., with the Greek princess Theophania, led to peace.

Fourth Period. From Otho the Great to Gregory VII. (1073). The Dominion of the German Kings.— In opposition to the designs of the Count of Tusculum, who wished to supplant the absent emperor at Rome, a noble Roman, the consul Crescentius, attempted to govern Rome under the semblance of her ancient liberty (980). Otho II., king since 973, occupied with his projects of conquest in Lower Italy, did not interfere with this administration, which became formidable to the vicious Popes Boniface VII. (anti-pope) and John XV. But when Otho III., who had reigned in Germany since 983, raised his kinsman Gregory V. to the popedom, Crescentius caused the latter to be expelled, and John XVI., a Greek to be elected by the people. He also endeavored to place Rome again under the nominal supremacy of the Byzantine empire. Otho, however, reinstated Gregory, besieged Crescentius in the castle of St. Angelo, took him prisoner and caused him to be beheaded with 12 other noble Romans (998). But the Romans again threw off their allegiance to the emperor, and yielded only to force. On the death of Otho III. (1002) the Italians considered their connection with the German empire as dissolved. Harduin, Marquis of Ivrea, was elected king, and crowned at Pavia. This was a sufficient motive for Milan, the enemy of Pavia, to declare for Henry II. (in Italy, I.) of Germany. A civil war ensued, in which every city, relying on its walls, took a greater or less part. Henry was chosen King of Italy by the nobles assembled in Pavia; but disturbances arose, in which a part of the city was destroyed by fire (1004). Not till after Harduin's death (1015) was Henry recognized as king by all Lombardy. He was succeeded by Conrad II. (in Italy, I.) At a diet held at Roncaglia, near Piacenza, in 1037, Conrad made the fiefs hereditary by a fundamental law of the empire, and endeavored to give stability and tranquillity to the State, but without success. The cities (which were daily becoming more powerful) and the bishops were engaged in continual quarrels with the nobility, and the nobility with their vassals, which could not be repressed. Republican Rome, under the influence of the family of Crescentius, could be reduced to obedience neither by Henry II. and Conrad II., nor by the Popes. When Henry III. (in Italy, II.), the son of Conrad, whom he succeeded in 1039, entered Italy (1046), he found three Popes in Rome, all of whom he deposed, appointing in their stead Clement II., and ever after filled the papal chair by his own authority with virtuous German ecclesiastics. This reform gave the Popes new consequence — a consequence which was severely felt by the successor of the emperor to whom the reform was due. Henry died in 1056. During the long minority of his son Henry IV. (in Italy, III.) the policy of the Popes, directed by the monk Hildebrand (afterward Gregory VII.), succeeded in creating an opposition which soon became formidable to the secular power. The Normans also contributed to this result. As early as 1016 warriors from Normandy had established themselves in Calabria and Apulia. Allies sometimes of the Lombards, sometimes of the republics, sometimes of the Greeks against each other and against the Saracens, they constantly became more powerful by petty wars. The great preparations of Leo IX. for their expulsion terminated in his defeat and capture (1053). On the other hand, Nicholas II. united with the Norman princes, and in 1059 invested Robert Guiscard with all the territories conquered by him in Lower Italy. From that time the Pope in his conflicts with the imperial power relied on the support of his faithful vassal, the Duke of Apulia and Calabria, to which Sicily was soon added. While the small States of the South were thus united into one large one, the kingdom in the North was dissolving into smaller States. The Lombard cities were laying the foundation of their future importance. Venice, Genoa, and Pisa were already powerful. Tme Pisanese, who in 980 had given to Otho II. efficient aid against the Greeks in Lower Italy, and in 1005 boldly attacked the Saracens there, ventured, in connection with the Genoese (no less warlike and skilled in navigation), to assail the infidels in their own territory,

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and twice conquered Sardinia (1017 and 1050), which they divided into several large fiefs, and distributed them among their principal citizens.

Fifth Period. From Gregory VII. to the Fall of the Hohenstaufen (1268). Struggles of the Popes and Republics with the Emperors.— Gregory VII. humbled Henry VII. in 1077. Urban II. instigated the emperor's own sons against their father. Conrad, the eldest, was crowned King of Italy in 1093, after whose death (1101) Henry, the second son, succeeded in deposing his father from the imperial throne. Henry V., the creature of the Pope, soon became his opponent; but after a severe conflict concluded with Calixtus II. the concordat of Worms (1122). A main point which remained unsettled gave rise to new difficulties in the 12th and 13th centuries — the estate of Matilda, Countess of Tuscany, who died in 1115, and by a will, the validity of which was disputed by the emperor, bequeathed all her property to the papal see. Meanwhile, in the S., the Norman State, under Roger II., was formed into a kingdom, from the ruins of republican liberty and of the Greek and Lombard dominion (1130). In the small republics of the North of Italy the government was in most cases divided between the consuls, the lesser council (*credenza*), the great council, and the popular assembly (*parlamento*). Petty feuds developed their youthful energies. Such were those that terminated with the destruction of Lodi by Milan (1111), and the 10 years' siege of Como by the forces of the same city, allied with those of nearly all the Lombard cities (1118–1127). The subjugation of this city rendered Milan the first power in Lombardy, and most of the neighboring cities maintained an alliance with her. Others formed a counter alliance with her antagonist, Pavia. In Rome the love of liberty, restrained by Gregory VII., rose in proportion as his successors ruled with less energy. The schisms between Gelasius II. and the anti-pope Gregory VIII., Innocent II. and the anti-pope Anacletus II., renewed the hopes of the Romans. Arnold of Brescia, formerly proscribed (1139) for his violent attacks against the luxury of the clergy in that country, was their leader (1146). After eight years Adrian IV. succeeded in effecting his execution. Frederick I. of Hohenstaufen (called Barbarossa) crossed the Alps six times, in order to defend his possessions in Italy against the republicanism of the Lombard cities. Embracing the cause of the Pavian union as the weaker, he devastated (1154) the territory of Milan destroyed Tortona, and was crowned in Pavia and Rome. In 1158 he reduced Milan, demolished the fortifications of Piacenza, and held a diet at Roncaglia, where he extended the imperial prerogatives conformably with the Justinian code, gave the cities chief magistrates (*podestà*), and proclaimed a general peace. His rigor having excited a new rebellion, he reduced Crema to ashes (1160), compelled Milan to submission, and having driven out all the inhabitants, demolished the fortifications (1162). Nothing, however, but the terror of his arms upheld his power. When the emperor entered Italy (1163) without an army, the cities concluded a union for maintaining their freedom, which in 1167 was converted into the Lombard confederacy. The confederates restored Milan, and, to hold in check the Ghibelline (imperial) city of Pavia, built a new city, called in honor of the Pope, Alessandria. Neither Frederick's governor, Christian, Archbishop of Mainz, nor he himself, could effect anything against the confederacy; the former failed before Ancona (1174), with all the power of Ghibelline Tuscany; and the latter, with the Germans, before Alessandria (1175). In the next year also (1176) he suffered a severe defeat at Legnano, in consequence of which he saw himself obliged to conclude a concordat with Alexander III., and a truce with the cities at Venice. Some years afterward a peace which secured their independence was signed at Constance (1183). The republics retained the *podestà* (foreign noblemen, now elected by themselves) as judges and generals. As formerly, all were to take the oath of fealty and allegiance to the emperor. But, instead of strengthening their league into a permanent confederacy (the only safety for Italy), they were soon split into new factions, when the designs of the Hohenstaufen on the throne of Sicily drew Frederick and Henry VI. (V.) from Lombardy. During the minority of Frederick II., and the disputes for the succession to the German throne, Innocent III. (Frederick's guardian) succeeded in reëstablishing the secular authority of the holy see in Rome and the surrounding country, and in enforcing its claims to the donations of Charlemagne and Matilda. In 1197 he also brought over almost all Tuscany, except Pisa, to the party of the Guelphs, the party opposed to foreign domination, and hence as a rule inclined to the Popes. A blind hereditary hatred rather than a zeal for the cause inspired the parties; for when a Guelph (Otho IV.) ascended the imperial throne the Guelphs became his party, and the Ghibellines the Pope's; but the reversion of the imperial crown to the house of Hohenstaufen in the person of Frederick II., who at the same time inherited from his mother, the Princess Constance, the kingdom of the Two Sicilies, soon restored the ancient relations (1212). In Florence this party spirit gave pretense and aliment (1215) to the disputes of the Buondelmonti and Don-

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ati with the Uberti and Amidei, originating in private causes; and most cities were thus internally divided into Guelphs and Ghibellines. The Guelph cities of Lombardy renewed the Lombard confederacy in 1226. After the emperor had returned from his crusade (1229), for undertaking which contrary to the will of the Pope he was excommunicated, he waged war with varying success against the cities, and against Gregory IX., heedless of the excommunication, while Ezzelino da Romano, under the pretense of favoring the Ghibellines, established by every kind of violence his own power in Padua, Verona, Vicenza, and the neighborhood. The papal court succeeded in seducing the Pisanese family of the Visconti of Gallura in Sardinia from the republic, and rendering them its vassals, notwithstanding the resistance of the republic, and especially of the counts of Gherardesca. Thence Pisa, too, was divided into Ghibellines (Conti) and Guelphs (Visconti). Frederick, however, married his natural son, Enzio, to a Visconti, and gave him the title of King of Sardinia. The plan of Gregory IX., to depose Frederick, was followed by Innocent IV., in the Council of Lyons (1245), whither the Pope had fled to be out of the power of Frederick. This greatly weakened the Ghibelline party, which was already nearly undermined by the intrigues of the mendicant orders. The hitherto faithful Parma revolted; and the war between Guelphs and Ghibellines raged with greater fury than ever. The Bolognese united all the cities of Italy in a Guelph league, and in the battle of Fossalta (1249) took Enzio prisoner, whom they never released. In the following year (1250) Frederick died, and his sons, Conrad IV. and Manfred, endeavored to maintain themselves in the possession of their hereditary dominions in Lower Italy; but Innocent IV., who now joyfully returned to Italy, excommunicated them, and his successor, Urban IV., offered the crown of Naples to Charles of Anjou, brother of Louis IX. of France, who accepted the offer and landed at the mouth of the Tiber in 1265. Conrad had died long before (1254), but Manfred offered an energetic resistance to the invader, till he was killed at the battle of Benevento in 1266. After this battle the power of the Ghibellines in Italy was completely broken. In the Trevisan Mark, in Upper Italy, they had maintained the supremacy under Ezzelino till 1259, when Ezzelino was taken prisoner by the Guelphs at the battle of Cassano. For two years after the battle of Benevento, Conradin, the son of Conrad IV., contested Naples with Charles of Anjou, but in 1268 fell by treachery into his hands and was executed. These contests were fatal to liberty; the house Della Scala followed that of Romano in Verona, and Milan itself, with a great part of Lombardy, found masters in the house Della Torre. Tyrants everywhere arose; the maritime republics and the republic of Tuscany alone remained free.

Sixth Period. From the Fall of the Hohenstaufen to the Formation of the Modern States.— In this period different princes attempted to usurp the sovereignty of Italy. (1) The Princes of Anjou. After Charles I. of Anjou had become, by the favor of the Pope, King of Naples, senator of Rome, papal vicar in Tuscany, and had directed his ambition to the throne of Italy (a policy in which his successors persevered), the names of Guelphs and Ghibellines acquired a new signification. The former denoted the friends, the latter the enemies of the French. Though with the fall of the Hohenstaufen the power of the German emperors in taly was practically at an end for the time, yet in Lombardy, and to some extent also in Tuscany, their supremacy was still at least nominally recognized; many Ghibellines still looked forward to a restoration of the Holy Roman empire in Italy as the only means of reëstablishing order, and others wishing to gratify their own schemes of ambition, often sought to obtain a legal authority for their usurpations by purchasing from the empire the title of imperial vicars. In Sicily, by the so-called Sicilian Vespers (1282), the French were driven out and the crown of the island was bestowed on Peter of Arragon, the son-in-law of Manfred, with whose help the inhabitants successfully resisted all the attempts of Charles of Anjou to recover the island, which remained separate from Naples for nearly 150 years. Thus the house of Arragon came to be the natural allies of the Ghibellines, as the house of Anjou were the allies of the Guelphs. To the factions of Guelphs and Ghibellines were added in the republics the parties of the nobility and the people. Everywhere in Middle and Upper Italy there was anarchy and civil war. The free republics experienced constant revolutions, and were engaged constantly either in party strife or war with towns or dynasties. The old confederacies were dissolved and their place taken by new and transitory alliances. The honest exertions of the noble Gregory X. (who died 1276) to establish peace were of no avail; those of Nicholas III. (1277–1281), who feared the preponderance of Charles, were more efficacious; but Martin IV. (1281–1285), servilely devoted to Charles, destroyed everything which had been effected and persecuted the Ghibellines with new animosity. A different interest — that of trade and navigation — impelled the maritime republics to mutual wars. The Genoese assisted Michael Palæologus (1261) to recover Constantinople from the Venetians, and received in requital

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Chios; at Meloria they annihilated (1284) the navy of the Pisans, and completed their dominion of the sea by a victory over the Venetians at Curzola (1298). In Tuscany the party of the Guelphs formed themselves under the leadership of Florence and the influence of the Church into a league for the maintenance of the national freedom against the imperial power. Only Pisa and Arezzo remained attached to the Ghibelline cause. In Lombardy it was different. Many towns indeed, such as Novara, Lodi, Vercelli, Asti, Cremona, and above all Milan, formed themselves into a Guelph confederacy; but there was on the one hand an equally strong Ghibelline confederacy, consisting of the cities of Verona, Mantua, Treviso, Parma, Piacenza, Reggio, Modena, and Brescia, opposed to this, and, on the other hand, those who, with the title of capitani, ruled in name of the people, had generally no hesitation in increasing their authority by attaching themselves to the empire. Freedom seemed to have expired when the people, weary of the everlasting feuds of their tyrants, rose in most of the cities, and expelled them (1302–1306), including the Visconti, who had supplanted the Della Torre (1277) in the government of Milan.

(2) *The Germans and the Della Scala.* Henry VII., the first emperor who had appeared in Italy for 60 years (1310), restored the princes to their cities, and found general submission to his requisitions, peace among the parties, and homage to the empire. Florence alone undertook the glorious part which she so nobly sustained for two centuries, as the guardian of Italian freedom, chose Robert of Naples, the enemy of Henry, her protector for five years (1313) and remained free while Italy swarmed with tyrants. Robert also held the dignity of papal vicar in the States of the Church during the pontificates of John XXII. and Benedict XII., the Popes then residing at Avignon under the influence of France in what is known as the second Babylonian captivity; but the authority of Robert in this capacity was merely nominal. He had no power to allay the violent discussions of the nobles, especially the Colonna and Orsini, or to check the general license and anarchy which prevailed. The Ghibelline Pisa received a master after the death of Henry (1313), in Uguccione della Faggiuola (1314), who also ruled over Lucca. After his expulsion Lucca received another lord in Castruccio Castracani (1316); Padua fell to the house of Carrara (1318); Alessandria, Tortona, and Cremona, to the Visconti of Milan; Mantua devolved by inheritance to the Gonzagas (1328); in Ferrara the long contested dominion of the Este was established (1317); and Ravenna was governed from about the beginning of the 14th century by the Polenta. In the other cities the same tyranny existed, but frequently changing from family to family, and therefore more oppressive. These petty princes, especially Della Scala, Matteo Visconti, and Castruccio, were a counterpoise to the ambitious views of Robert of Naples, son of Charles II. of Naples. Robert, however, acquired for his son Charles of Calabria the government of Florence and Siena, which he retained till his death. Louis of Bavaria, who came to Italy (1327) to reduce the Anjous and the Guelphs, became himself at variance with the Ghibellines, whom he alienated by his caprice and perfidy; and the character of John XXII. so cooled the zeal of the Guelphs that both parties, recognizing the common interest of liberty, became somewhat more friendly. The amiable adventurer John, King of Bohemia, suddenly entered Italy (1330). Invited by the inhabitants of Brescia, favored by the Pope, elected Lord of Lucca, everywhere acting the part of a mediator and peacemaker, he would have succeeded in establishing the power at which he aimed had he not been opposed by the Florentines. On his second expedition to Italy (1333) Azzo Visconti, Mastino della Scala, and Robert of Naples united against him and his ally, the papal legate Bertrand of Poggetto, who aspired to the dominion of Bologna. After the downfall of both (1334), when the Pepoli began to rule in Bologna, Mastino della Scala, master of half Lombardy and of Lucca, began to menace the freedom of Lombardy. Florence led the opposition against him, and excited a war of the league in which it gained nothing but the security of its liberty. After the baffled Mastino had sold Lucca to the Florentines the Pisans arose and conquered it for themselves (1342). In Rome, still torn by the feuds of the nobles, Cola di Rienzi (1347) sought to restore order and tranquillity; he was appointed tribune of the people, but was forced, after seven months, to yield to the nobility. Having returned, after seven years of banishment with the legate Cardinal Albornoz (1354), he ruled again a short time, when he was murdered in an insurrection.

About this time Italy suffered by a terrible famine (1347) and a still more terrible pestilence (1348) which swept away two-thirds of the population. No less terrible was the scourge of the *bande* (banditti), or large companies of soldiers, who, after every peace, continued the war on their own account, ravaging the whole country with fire and sword; such as the bands of the Count of Werner and of Montreal. About this time the Emperor Charles IV. made that expedition into Italy from which may be dated the gradual extinction of the political parties of Guelphs and Ghibellines. Charles had himself crowned King

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of Lombardy at Milan, and emperor at Rome, but he saw that neither of the Italian parties really desired foreign domination, and that the Ghibellines merely gave the empire their support for their own party purposes, and he therefore did not seek to strengthen himself by attaching himself to either party, but was content to add to his resources for the government of the empire in Germany by selling to the towns and princes the imperial rights in Italy. From this time forth then, instead of the constant feuds between Guelphs and Ghibellines, we find princes and free towns contending with one another for the extension of their territories, and instead of the citizen armies of former times, bands of mercenaries whose enterprising leaders (*condottieri*) not seldom held the fate of States in their hands and acquired dominions of their own. In the middle of the 14th century the most aggressive family in Italy was that of the Visconti of Milan. in 1353 the republic of Geneva submitted to Giovanni Visconti, Archbishop and Lord of Milan, who in 1350 had purchased Bologna from the Pepoli; but his enterprise against Tuscany failed through the resistance of the confederated Tuscan republics. Another league against him was concluded by the Venetians (1354) with the petty tyrants of Lombardy, but in the end the former became not only opponents but rivals of the Milanese in their plans of aggrandizement. In 1395 Giangaleazzo Visconti obtained from the Emperor Wenzel (Wenceslaus) Milan, as a duchy in fief, and within the next seven years brought under his power in succession Siena, Perugia, and Bologna, so that Florence alone still stood up for the cause of freedom, and it also was threatened. After the death in 1403 of this member of the Visconti family a great part of their possessions was lost during the minority of his sons, but their power was soon again in the ascendant. Duke Filippo Maria Visconti between 1416 and 1420 reconquered all his States in Lombardy, and in 1421 Genoa also submitted to him. In 1425 the Venetians in alliance with the Florentines conquered all the territory of Northeastern Italy as far as the Adda, which they retained in the peace of Ferrara in 1428.

After this humiliation of Milan there was for many years to come no State in Italy so much stronger than the rest as to endanger the balance of power; for though Naples and Sicily, the latter attached since 1409 to the Arragonese crown, were again brought under one ruler in 1435 by the succession of Alfonso V. of Arragon to the kingdom of Naples, that monarch had his attention too fully occupied by the intrigues and disturbances of the Anjou party to be able to interfere in the affairs of the other States. Yet mutual jealousy still excited frequent wars in which two parties among the Italian mercenary soldiers, the Bracheschi (from Braccio da Montone) and the Sforzeschi (so called from Sforza Attendolo), continued always hostile to each other, contrary to the custom of those mercenary bands. After the extinction of the male line of the Visconti (1447), Francis Sforza succeeded in gaining possession of the Milanese State (1450). On the death of Alfonso V. of Arragon, Naples was again separated from Sicily, which remained attached to the crown of Arragon, and fell to John II., the brother of Alfonso, while Naples was inherited by Ferdinand, the natural son of Alfonso. The Venetians having formed a union with some princes against him, found an ally in Florence, which, with a change of circumstances, wisely altered her policy. About this time the family of the Medici attained to power in that city by their wealth and talent. Milan, Venice (which possessed half of Lombardy), Florence (wisely managed by Lorenzo Medici), the States of the Church (for the most part restored to the holy see), and Naples (which was incapable of employing its forces in direct attacks on other States), constituted in the 15th century the political balance of Italy, which during the manifold feuds of these States, permitted no one to become dangerous to the independence of the rest till 1494, when Charles VIII. of France at the suggestion of Lodovico Sforza (called Il Moro) entered Italy to conquer Naples as the inheritance of the house of Anjou. After an unresisted march through Italy Charles took possession of Naples; but while he wasted his time in festivities at the capital a league was formed against him by the leading Italian States, who were joined by Ferdinand of Arragon, and he was compelled hastily to retreat, leaving only a small body of troops to protect his new conquest.

In 1496 the whole of Naples was reconquered from the French by Gonsalvo of Cordova, the general of Ferdinand, and the Arragonese dynasty restored. Louis XII., the successor of Charles VIII., resumed the plans of the latter, and on this occasion Ferdinand of Spain was the ally of the French king. The two monarchs having conquered Naples, fell to disputing between themselves as to the division of their conquest, war was declared between them, the result of which was that Ferdinand managed to retain the whole conquest for himself, which was thus reunited to Sicily and Arragon (1501–1504). Louis was more successful against Milan, which, supported by hereditary claims derived through his grandmother Valentina Visconti, wife of Louis of Valois, Duke of Orleans, brother of Charles VI. of France, he subjected to himself in 1500. The attempts of Cesare Borgia, the son of Pope Alexander VI., to

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acquire the sovereignty of Italy were frustrated by the death of his father (1503), when the warlike Pope Julius II. completed the subjugation of the States of the Church, not indeed for a son or nephew, but in the name of the holy see. He concluded with Maximilian I., Ferdinand the Catholic, and Louis XII. the league of Cambray (1508) against the ambitious policy of the Venetians, who artfully succeeded in dissolving the league which threatened them with destruction. The Pope then formed the so-called Holy League with the Venetians themselves, Spain and the Swiss, for the purpose of driving the French from Italy, but the object of the league was not carried out till later. Maximilian Sforza, who had reacquired Milan (1512), relinquished it without reserve to Francis I. (1515) after the battle of Marignano, but the Emperor Charles V. assumed it as a reverted fief of the empire, and conferred it on Francesco Sforza, brother of Maximilian (1520). This was the cause of violent wars, in which the efforts of Francis were always unsuccessful. He was taken prisoner at Pavia (1525), and, with his other claims, was compelled to renounce those on Milan, which remained to Francesco Sforza, and after his death (1540), was granted by Charles V. to Filippo, the son of Francesco. The Medicean Popes, Leo X. (1513–1521) and Clement VII. (1523–1534), were bent, for the most part, on the aggrandizement of their family. Charles V., to whom all Italy submitted after the battle of Pavia, frustrated indeed the attempts of Clement VII. to weaken his power, and conquered and pillaged Rome (1527); but becoming reconciled with the Pope, he raised the Medici to the rank of princes. Florence, which through inner demoralization had lost its ancient love of freedom, and had already for a considerable time been in fact though not in name ruled by the Medici, was now converted into a regular principality under Alessandro de Medici, who was imposed on the Florentines by the arms of Charles V. (1530).

Seventh Period. Mutations of the Italian States Down to the French Revolution.—After the extinction of the male branch of the marquises of Montferrat, Charles V. gave this State to the Gonzagas of Mantua (1536). Parma and Piacenza, which Julius II. had conquered for the papal see, Paul III. erected into a duchy (1545), which he gave to his natural son Peter Alois Farnese, whose son Ottavio obtained imperial investiture in 1556. Genoa, subject to the French since 1499, found a deliverer in Andrea Doria (1528). He founded the aristocracy, and the conspiracy of Fiesco (1547) failed to subvert him. In 1553, besides Milan, Charles V. conferred Naples also on his son Philip II., and for a century and a half from this time the Austro-Spanish influence, unfortunately for the intellectual and political life of the peninsula, was predominant in Italy. In the second half of the 16th century the prosperity of Italy was increased by a long peace, as much as the loss of its commerce allowed. The tranquillity continued till the contest for the succession of Mantua and Montferrat after the extinction of the Gonzaga family (1627). Misfortunes in Germany compelled Ferdinand II. to confer both countries as a fief on Charles of Nevers, the protégé of France, whose family remained in possession till the War of the Spanish Succession. The peace of Italy was not interrupted during the second half of the 17th century, except by the attempts of Louis XIV. on Savoy and Piedmont, and appeared to be secured for a long time by the treaty of neutrality at Turin (1696), when the War of the Spanish Succession broke out. Austria conquered Milan, Mantua, and Montferrat (1706), retained the two first (Mantua was forfeited by the felony of the duke), and gave the last to Savoy. In the peace of Rastadt (1714) Austria obtained, moreover, Sardinia and Naples; Savoy obtained Sicily, which it exchanged with Austria for Sardinia, from which it assumed the royal title. The house of Farnese becoming extinct in 1731, the Spanish Infante Charles, son of Elizabeth Farnese, daughter of the eldest brother of Antonio, the last duke of the Farnese family, obtained Parma and Piacenza. In the war for the Polish throne of 1733, Charles Emmanuel of Savoy, in alliance with France and Spain, conquered the Milanese territory, and received therefrom, in the peace of Vienna (1738), Novara and Tortona. Charles, Infante of Spain, became King of the Two Sicilies, and ceded Parma and Piacenza to Austria. The Medici of Florence entitled, since 1575 Grand-Dukes of Tuscany, became extinct in 1737; and Francis Stephan, Duke of Lorraine, then received Tuscany by the preliminaries of Vienna, and becoming emperor in 1745, made it the appanage of the younger line of the Austro-Lorraine house. In the War of the Austrian Succession the Spaniards conquered Milan (1745), but were expelled thence by Charles Emmanuel, to whom Maria Theresa ceded in reward some Milanese districts. Massa and Carrara fell to Modena in 1743 by right of inheritance. The Spanish Infante, Don Philip, conquered Parma and Piacenza in his own name, lost them and obtained them as a hereditary duchy (1748). Thus in the 18th century the houses of Lorraine, Bourbon, and Savoy possessed all Italy with the exception of the ecclesiastical territories, Modena, and the republics, which beheld with apathy operations in which they had no share. A quiet of 40 years ushered in their downfall.

Eighth Period. From the French Revolution to the Peace of 1815.—The French

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Revolution had a great influence on the history of Italy. In September, 1792, the French troops first penetrated into Savoy, even before the King of Sardinia had openly joined the Austrians in entering the first coalition. Though expelled for some time in 1793 by the Piedmontese and Austrians, they held it at the end of the year. The National Convention had already declared war against Naples in February, 1793. In April, 1794, the French advanced into the Piedmontese and Genoese territories, but were expelled from Italy in July, 1795, by the Austrians, Sardinians, and Neapolitans. It was different, however, when in 1796 Napoleon Bonaparte received the chief command of the French army in Italy. He forced the King of Sardinia to conclude a treaty of peace by which the latter was obliged to cede Nizza (Nice) and Savoy to France; conquered Austrian Lombardy, with the exception of Mantua; and exacted large sums of money from Parma, Modena, Tuscany, and other States.

In January of the following year (1797) Mantua also surrendered, and the rapid successes of the conqueror so alarmed the Pope as to induce him to purchase peace by the cession of Bologna, Ferrara, and Romagna in Italy, and Avignon in France; the payment of a money indemnity, and the surrender of art treasures (peace of Tolentino, 1797). Bonaparte then advanced into Austrian Germany, and a rising having taken place among the Venetians in his rear, he made this a pretext for overthrowing the Venetian State. In October, 1797, the peace of Campo Formio was concluded by which the Cisalpine republic was formed out of the Italian territories which had been surrendered by Austria and the Pope, together with some sections taken from other powers. Austria received in compensation Venetia and Dalmatia. (See CISALPINE REPUBLIC.) A few days later Sardinia concluded a treaty of alliance with France. The French then advanced toward Rome, overthrew the ecclesiastical government, and erected a Roman republic (1798). In Genoa, in the same year, Bonaparte occasioned a revolution by which a democratic republic was formed after the model of the French, under the name of the Ligurian republic; and Lucca also was obliged to accept a republican form of government. In 1798 the second coalition against France was formed, and the King of Naples, instigated by his wife, a daughter of Maria Theresa, took the opportunity of sending a Neapolitan army to attack the French at Rome. The French were at first driven out, but under Championnet they soon returned and repulsed the Neapolitan army, forcing it to retreat into its own territory where they followed it. The court then fled from Naples to Sicily, and Championnet having taken the capital after an obstinate resistance, erected Naples into the Parthenopean republic. The French Directory likewise thought the formation of the second coalition a good opportunity for compelling the King of Sardinia to surrender his territories on the continent, and Piedmont received a military administration. The same fate befell Tuscany, which had formed an alliance with Naples and Britain. In consequence of the victories of the coalition, the French were again driven out of Rome, Naples, and the rest of Italy except Genoa, and the King of Sardinia and the Pope returned to their capitals; but in the brilliant campaign of 1800 Napoleon destroyed all the advantages gained by the allies in Upper Italy, the most of which he reconquered.

By the peace of Lunéville (Feb. 9, 1801), the possession of Venice was confirmed to Austria. The Duke of Parma received Tuscany, and afterward from Bonaparte the title of King of Etruria. Parma was united with France. The Cisalpine and Ligurian republics were guaranteed by Austria and France, and with the Ligurian territories were united the imperial fiefs included within their limits. The King of Naples, who had occupied the States of the Church, was obliged to conclude peace at Florence (March 28). By Russian mediation he escaped with the cession of Piombino, the Stato degli Presidj, and his half of the island of Elba, together with the promise of closing his harbors against the British. The other half of Elba Tuscany had already relinquished to France; but the whole island was obstinately defended by the British and Corsicans, with the armed inhabitants, and not evacuated till autumn. The Stato degli Presidj, France ceded to Etruria, September 19. To the republics of Genoa and Lucca the first consul gave new constitutions in 1801. In January, 1802, the Cisalpine republic was transformed into an Italian republic, formed on the model of the new French constitution, and Bonaparte became president. He appointed the citizen Melzi d'Erile vice-president. Genoa also received a new constitution, and Girolamo Durazzo for doge. Piedmont, however, was united with France. After Bonaparte had become emperor in 1804 he attached (March 17, 1805) the royal crown of Italy to the new imperial crown; he promised, however, never to unite the new monarchy with France, and even to give it a king of its own. The new constitution was similar to that of the French empire.

Napoleon founded the Order of the Iron Crown, and having placed the crown on his own head at Milan May 26, he appointed his stepson, Eugène Beauharnais, Viceroy of Italy, who labored with great zeal for the improvement of all branches of the government, of industry, and the arts. Circumstances, however, rendered this new

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government oppressive, as the public expenses during peace amounted to 100,000,000 francs ($20,000,000), which were all to be contributed by less than 4,000,000 people. No European power recognized expressly the Italian kingdom of Napoleon. The emperor continued to strengthen his power against the active enemies of the new order of things. He seized Dalmatia, and annexed it to the kingdom of Italy, while he gave to his sister Elise Bacciocchi, wife of Pasquale Bacciocchi, Piombino and Lucca as French dependencies. On May 24, 1806, Guastalla, on the 25th the Ligurian republic, and on July 21 Parma and Piacenza were made French provinces. The Pope was obliged to sanction the imperial coronation by his presence. In 1806 Naples also was occupied by the French, and on March 31 Napoleon gave it as a kingdom to his brother Joseph; and afterward, in 1808, when Joseph was nominated to the throne of Spain, to Joachim Murat, Grand-Duke of Berg; while the English secured the rightful King Ferdinand in the possession of Sicily. In 1808 Etruria was annexed to France, and in 1809 Tuscany was given to Napoleon's sister Elise as a grand-duchy. In the same year (1809) the States of the Church were entirely united to France. After the peace of Venice Istria and Dalmatia were separated from the kingdom of Italy, and incorporated with the newly created kingdom of Illyria. Bavaria was obliged to cede to Italy the circle of the Etsch (Adige) in the Tyrol, a part of the circle of Eisack, and the district of Clausen.

The power of the French emperor was now to all appearance as firmly established in Italy as in all Europe. While the Italian people were supporting French armies, sacrificing their own troops in the ambitious wars of Napoleon in remote regions and were obliged to pay heavy taxes in the midst of the total ruin of their commerce, all the periodicals were full of praises of the institutions for the encouragement of science, arts, and industry in Italy. After the fatal retreat from Russia, Murat, whom Napoleon had personally offended, deserted the cause of France, and joined Austria, Jan. 11, 1814, whose army penetrated into Italy under Bellegarde. The viceroy, Eugène, continued true to Napoleon and his own character, and offered to the enemies of his dynasty the boldest resistance, which was frustrated by the fall of Napoleon in France. After the truce of April 21, 1814, the French troops evacuated all Italy and most of the provinces were restored to their legitimate sovereigns. The wife of Napoleon, however, the Empress Maria Louisa, obtained the duchies of Parma, Piacenza, and Guastalla, with reversion to her son; and Napoleon himself became sovereign of Elba, of which he took possession, May 4. But before the Congress of Vienna had organized the political relations of Europe, he effected his return to France, March 1, 1815. At the same time the King of Naples, Murat (see MURAT), abandoned his former ambiguous attitude, and took up arms as he pretended for the independence of Italy. But his appeal to the Italians, March 30, was answered by a declaration of war by Austria, April 12. Driven from Bologna by the Austrian forces April 15, and totally defeated by Bianchi at Tolentino, May 2 and 3, he lost the kingdom of Naples, into which the Austrian general Nugent had penetrated from Rome, and Bianchi from Aquila, seven weeks after the opening of the campaign. He embarked from Naples with a view of escaping to France, May 19. Ferdinand IV. returned from Palermo, and Murat's family found an asylum in Austria. Murat himself made a descent in Calabria from Corsica, in order to recover his lost kingdom, but was taken prisoner at Pizzo, brought before a court-martial, and shot Oct. 14, 1815.

Meanwhile the Congress of Vienna, by the act of June 9, 1815, had arranged the affairs of Italy. (1) The King of Sardinia was reinstated in his territories, according to the boundaries of 1792, with some alterations on the side of Geneva; for the portion of Savoy left in possession of France by the peace of Paris of May 30, 1814, was restored by the treaty of Paris of Nov. 20, 1815. To his States was united Genoa as a duchy, according to the boundaries of that republic in 1792, and contrary to the promises made to Genoa. (2) The Emperor of Austria united with his hereditary States the new Lombardo-Venetian provinces formerly belonging to Austria — the Valteline, Bormio, and Chiavenna, separated from the Grisons, besides Mantua and Milan. Istria, however, was united with the Germanic-Austrian kingdom of Illyria; Dalmatia, with Ragusa and Cattaro, constituting a distinct Austrian kingdom. (3) The valley of the Po was adopted as the boundary between the States of the Church and Parma, otherwise the boundaries of Jan. 1, 1792, were retained. The Austrian house of Este again received Modena, Reggio, Mirandola, Massa, and Carrara. (4) The Empress Maria Louisa received the State of Parma as a sovereign duchess, but by the treaty of Paris of June 10, 1817, only for life, it being agreed that the Duchess of Lucca and her descendants should inherit it. Lucca in that case fell to the Tuscan dynasty, which in return resigned its districts in Bohemia to the Duke of Reichstadt. (5) The Archduke Ferdinand of Austria became again Grand-Duke of Tuscany, to which were joined the Stato degli Presidj, the former Neapolitan part of the island of Elba, the principality of Piombino, and some small included dis-

tricts formerly fiefs of the German empire. The Prince Buoncompagni Ludovisi retained all his rights of property in Elba and Piombino. (6) The Infanta Maria Louisa received Lucca, of which she took possession as a sovereign duchy 1817, with an annuity of 500,000 francs, till the reversion of Parma. (7) The territories of the Church were all restored with the exception of the strip of land on the left bank of the Po; and Austria retained the right of maintaining garrisons in Ferrara and Commacchio. (8) Ferdinand IV. was again recognized as King of the Two Sicilies. Great Britain retained Malta. The knights of Malta, who had recovered their possessions in the States of the Church and in the kingdom of the Two Sicilies (in Spain, 1815), for a time made Catania, and after 1826 Ferrara their residence. The republic of San Marino, and the Prince of Monaco, whose mountain fortress the Sardinians, and before them the French occupied, alone remained unharmed amid the 15 political revolutions which Italy had undergone in the course of 25 years. The Austrian predominance was thus more firmly established than ever in Italy.

Ninth Period. From the Peace of 1815 to the Present Time.— Though the final result of all the commotions and changes that had taken place in the political situation of Italy and its component States since the outbreak of the French Revolution was to leave the country in the same divided and dependent condition in which it had existed before, yet there was a strong desire for union and independence among the people. Traces of a struggle for a united and liberal government were almost everywhere visible; and several of the governments, Naples, Rome, and Turin in particular, in vain endeavored to protect themselves against secret political societies (Unitarians, Carbonari) and Freemasonry by inquisitory tribunals, Jesuits, and secret police. While the spirit of Carbonarism (see CARBONARI), having for its object the union of Italy under one government and its independence of foreign powers, particularly of Austria, excited by the Spanish Revolution of 1820, threatened to subvert the political institutions of the peninsula in general, as well as of the single States; and in some places actually shook them, especially in Naples and Sicily, where in 1820 Ferdinand I. (IV.) was compelled to promise a constitution similar to that granted to Spain in 1812; and likewise in Sardinia, where Victor Emmanuel abdicated in 1821 in favor of his brother Charles Felix. The cabinets of the great European powers in the meantime supported the principle of conservatism by a prompt suppression of every tendency to revolution. Austria, as the power most nearly concerned in the insurrections in Italy, and which already in 1815 had acceded to the institution of a representative government, now undertook, with the approbation of the other powers assembled at the Congress of Laibach, to restore despotism in Naples and Sicily as well as in Sardinia, which actually took place in March and April, 1821. In accordance with the political maxims laid down at the Congress of Laibach and another subsequently held at Verona, the system of repression was, subsequently to these events, carried out with the utmost rigor. But while, on the one hand, a despotic reaction was systematically organized in various States by means of the Jesuits and similar agencies, a revival of the secret political societies took place and diffused itself with equal vigor on the other. Against these the strongest measures were employed by the government. Great cruelties were practised in Naples and Sicily, even on those who were only the objects of political suspicion; and this took place more especially in Modena, where in 1821 Duke Francis IV. had placed himself at the head of a system of secret police. In the Lombardo-Venetian kingdom, in Parma and Lucca, as also in Tuscany and the Papal States, less stringent measures were adopted. The judicious policy of Pope Pius VII. and his Secretary of State, Cardinal Consalvi, contributed much to soothe the popular mind and establish internal tranquillity — a system carried out by his successors, Leo XII. and Pius VIII., who contented themselves with merely excommunicating the Carbonari and other secret societies without calling to account the participators in earlier political unions. Their example was followed in Parma and Lucca, and likewise in Tuscany, when Leopold II. succeeded his father Ferdinand III.

The causes which had produced the Italian revolutions of 1820 and 1821 continued in the meanwhile to operate with unabated force; and by the arbitrary proscription and imprisonment of so many distinguished and popular individuals a still deeper hatred of government was roused. When in 1830 in consequence of the French revolution of July a general spirit of revolt spread itself throughout Europe, the Italians likewise considered the state of events a favorable conjuncture for striking a blow for national and political freedom. But the hopes of the patriots were soon quenched. The risings in Modena, Parma, and Bologna were suppressed by Austrian troops, and the reigning princes who had been driven out of the first two States returned to their dominions. In the States of the Church the papal troops, recruited from banditti and criminals, were employed to put down the uprisen provinces, and they behaved with so much violence that Austrian forces were necessary to defend the government and country from their own soldiers. In order not to allow all the power in Italy to fall

into the hands of the Austrians the French suddenly occupied Ancona in February, 1832, and they retained it for several years. An invasion of Savoy from Switzerland by a band of Italian and Polish exiles under the Genoese Ramorino, undertaken with the purpose of overthrowing the Sardinian throne, and then in conjunction with the Italian patriots headed by Mazzini, who gave themselves the name of "Young Italy," bringing about a revolution throughout the whole country, ended in a miserable failure (February, 1834).

On the failure and bloody suppression of these attempts at revolution an apparent tranquillity prevailed throughout Italy; but it was only the tranquillity of exhaustion. The unwearied activity of the secret societies, more especially of Mazzini's "Young Italy" with its republican tendencies, diffused itself over a great part of the peninsula. In 1838 Ancona was evacuated by the French; and at the same time the Austrian troops quitted the Papal States, while the amnesty, proclaimed a short time previously in Venice and Lombardy, appeared to produce a lasting conciliatory effect on the minds of the people. Yet the feeling of discontent secretly remained and received support from the alertness and industry of the exiles and emigrants. Isolated attempts at revolt in the Romagna in 1843 and 1844 and the insurrection at Rimini in 1845 might at least be regarded as important symptoms, while the method adopted by the papal government in dealing with these occurrences only served to widen the breach. Along with these revolutionary tendencies a definite wish for procuring a moderate amount of reform was gradually taking possession of the minds of the educated part of the community. This had already been discussed since 1839 in the assemblies of the literati, who, entertaining the idea of a national confederacy, supported the project of an Italian Customs Union or Zollverein, and rested their hopes partly on the milder and better administered government of Tuscany, partly on a peaceful revolution taking place in Sardinia.

Governments such as those of Naples and Rome had lost all popular sympathy; and the rule of Austria in the N., notwithstanding the introduction of numerous improvements, had failed in conciliating the minds of the liberal and national party. A general languor and inaction had also, as afterward appeared, crept by this time into the Austrian government, which neglected to secure the means of energetically withstanding a violent outbreak. At this juncture Pope Gregory XVI. died, in June, 1846, and the election of Cardinal Mastai Ferretti to the papacy under the name of Pius IX. seemed to mark an epoch in the history of Italy, for the spirit of reform which he introduced into the government of the

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Papal States soon spread to Tuscany and Sardinia. While thus in Rome, Florence, and Turin the new political system carried the day, and the inhabitants hailed with enthusiasm the altered times and the commencement of a new era, complaints resounded in corresponding proportion over the rest of Italy of oppression and neglect of public obligations. Naples and Austria stood forth more especially in opposition to the new system of politics. Naples had succeeded in suppressing the violent attempts made in the summer of 1847 without putting a stop, however, to the increasing ferment. In Lombardy Austria still maintained the old system, and by the investment of Ferrara in August, 1847, made a tolerably unmistakable declaration against the papal policy. Among the small States, Modena, where in 1846 Duke Francis V. had succeeded his father, rejected all proposals of reform, in reliance on the Austrian bayonets. By virtue of a treaty Lucca passed over in October, 1847, from a branch of the Bourbon family to Tuscany, while to these same Bourbons Parma, Piacenza, and Guastalla passed in December of the same year by the death of Maria Louisa. Here, as in Modena, the ruling powers sought to prop themselves by the assistance of Austria, which meantime found occupation for itself in an attack within its own territory. The opposition of the Lombardic population, nursed by political and national aversion, became more manifest every day, and from subdued murmurs of discontent proceeded to unconcealed expressions of hostility. Throughout the whole of Italy a hatred of the Austrian sway was systematically cherished, and to the whole movement a hostile direction gradually given against Austria. The old Austrian policy, now in its last agonies, found itself wholly incapable to meet in any way the threatened storm. The commotion was as great in other parts of Italy. In January, 1848, the inhabitants of the island of Sicily were in rebellion, demanding a constitution and ultimately the complete severance of the island from the continental government.

At this season of political ferment the revolution of February, 1848, broke out in France, and produced an electric effect throughout Europe. Owing to the bitter hatred with which the inhabitants of the Lombardo-Venetian kingdom regarded the Austrian rule, sanguinary disturbances had already taken place in the previous month of January, and the violent proceedings instituted by the government against the principal actors in them had only served to augment the general detestation of its sway. The proclamation of martial law in February could scarcely, in the visible decline of the Austrian power, produce the desired effect on the popular mind by inspiring terror. On the arrival of the news

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of the Paris Revolution the reserve which had hitherto prevailed in Upper Italy, was thrown aside, and the overwhelming intelligence of the insurrection in Vienna soon completed the universal eruption. Without the intention of reform or the power to crush opposition the Austrian government adoptd a policy characterized partly by timidity, partly by violence. The insurrection at Milan, on March 22, followed by similar commotions throughout almost the whole of North Italy, compelled the Austrian army to evacuate the capital and retreat to Verona; while Venice, by the hasty capitulation of the authorities, recovered independence, and the reign of despotism ended in Parma and Modena.

These events inspired Charles Albert, King of Sardina, with the hope of making himself master of the Lombardo-Venetian kingdom and carrying out his idea of a national Italian confederacy. He therefore declared war against Austria, and supported by numerous Italian free companies during the first period of enthusiasm and surprise, drove back the enemy's troops to the N. frontier of Italy. The position of affairs soon changed, however. On May 6 Radetzky (then in his 82d year) successfully withstood the attacks of the Italians at Santa Lucia, not far from Verona, and on July 25 gained at Custozza a second bloody victory, which resulted in the reconquest of Milan and the whole of Lombardy. The King of Sardinia made his escape by night into his own territories, and then concluded an armistice with the victors. Pushed on by the democrats Charles Albert renewed his attempts in the following year (1849), but in a campaign of five days (March 20–24) the old field-marshal put a speedy termination to the enterprise and frustrated the hopes of the Italian patriots. Charles Albert, despairing of his fortunes, abdicated in favor of his son Victor Emmanuel, and fled by secret roads from his dominions. The young king then concluded a disadvantageous peace with Austria. Since that date the Sardinian government has gone steadily onward in the direction of reform and development of its internal resources. Venice resisted for some months longer the besieging army of the Austrians, but at last surrendered (Aug. 25, 1849).

In other parts of Italy events had meanwhile taken a similar course. In Rome, where Pope Pius IX., alarmed at the sudden outbreaks of revolutionary projects, checked himself in his career of reform, the excitement soon grew to such a pitch that he lost all control of his subjects. In vain he promised a constitution and summoned an assembly of the States to the capital. His minister Rossi was assassinated in November, 1848, whereupon the democrats took all the power into their own hands. The Pope fled in terror to Gaeta, leaving his capital in the hands of the populace and the insurgent volunteers, who erected a Roman republic, and even laid hands on the Church property (February, 1849). Mazzini, the active head of "Young Italy," and Garibaldi, the leader of the volunteers, ruled in Rome. The Pope now appealed to the protecting States for help, and was so far successful that a French army under General Oudinot marched up to the walls of Rome and demanded the restoration of the old order of things. When this was refused the French proceeded to lay siege to the city, but met with so determined an opposition that it was only after frequent bloody contests extending over several weeks that the city fell into their hands (July, 1849). The republicans sought safety in flight, a French garrison was permanently posted in Rome, and the old condition of affairs was gradually restored. The insurgent Sicilians had no better success than the Lombards, Venetians, and Romans, being gradually subdued by the Neapolitan arms. In Tuscany, as in Rome, the democrats for a short period obtained the upper hand and compelled the grand-duke to flee, but the republican form of government lasted only a few weeks. Sardinia, therefore, remained the only State which preserved the constitutional benefits resulting from 1848, and strenuously withstood all requisitions to act otherwise. The Lombardo-Venetian kingdom entered the States of the Austrian union, while notwithstanding a few conciliatory measures, military dictatorship was maintained.

In Rome, which the Pope again entered in April, 1850, the new organization of the State restored the spiritual rule with a silent abrogation of the constitution of 1848. In Naples the last trace of freedom was abolished, and against the promoters of the insurrection of 1848 legal proceedings were begun which engaged deeply the attention of foreign countries. In Tuscany, occupied by Austrian troops and wholly bound to Austria by a military convention, despotism and priestly power returned in all their force. In Modena and Parma the returned princes, pursued a policy of revenge and repression against the adherents of a free political life. In such circumstances the condition of Italy, harassed and unsettled, presented a most melancholy picture; nor could some important non-political improvements, including the formation of railways, the accession to the Austrian postal union, and the freedom of the navigation of the Po, effect any satisfactory amelioration. The extraordinary increase of robberies, especially in Central Italy, the almost unintermitted exercise of martial law, the continued existence of secret societies and the scantily veiled expressions of hatred to the ruling powers, in spite of all the military

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severity of governments, showed, as at Milan, in February, 1853, how unsatisfactory was the state of the political and social relations of the country. The same system prevailed with little amendment up to the year 1859. In Naples the cruelties exercised on political prisoners, which led to a cessation of intercourse between that State and Great Britain, were still continued with unabated severity, and a complete reign of terror prevailed throughout Southern Italy. Though in a milder form, the system of repression was likewise rigorously maintained in the Central and Northern States of the peninsula. Sardinia alone, exhibited free institutions in the midst of the surrounding despotism and intolerance, religious and political.

Austrian oppression in Lombardo-Venetia, the tyranny of the kings of Naples, and the misgovernment of the Papal States and of the duchies, abetted by Austria, led to the war of 1859, when France, siding with Sardinia, defeated the Austrians at Magenta (June 4) and Solferino (June 24), and drove them out of Lombardy, after which Francis Joseph, Emperor of Austria, in a personal interview with Napoleon III., Emperor of the French, at Villafranca, agreed to the preliminaries of a peace, stipulating for the surrender of Lombardy as far as the line of Peschiera and Mantua, by Austria to France, the formation of a confederacy of Italian States under the presidency of the Pope, and the return of the princes who had been expelled in the course of the war from their dominions by their subjects, provided that their return was not effected by foreign intervention but only by the will of their subjects. Of these three preliminaries only the first was ultimately ratified by the treaty of Zürich (Nov. 10, 1859). Lombardy was ceded to France, who gave it up to the King of Sardinia, in return for which the latter ceded to France some time later Savoy, the ancestral domain of his family, and Nice. The other two stipulations of the preliminaries of Villafranca were not carried out. So far from inviting back their banished rulers, the inhabitants of the duchies hastened to summon assemblies to pronounce their deposition, and to annex themselves to Sardinia. Even Bologna withdrew from the papal rule, and put itself under the protection of Victor Emmanuel. In March, 1860, popular votes were taken in Savoy, Nice, Tuscany, Parma, Modena, and the four Northern papal legations, constituting Romagna, resulting in the cession of the first two to France, and the remainder were incorporated in the kingdom of Sardinia.

Neither the protests of Switzerland against the surrender of the districts on the S. of the Lake of Geneva nor the ban of excommunication pronounced by the Pope on the chief actors in these events could prevent them from taking their course. Meanwhile the victorious career of Garibaldi in Sicily and Lower Italy had led to the dethronement of the King of Naples, and the detachment of the provinces of Umbria, Urbino, and the Marshes, with Benevento and Pontecorvo, inclosed by the kingdom of Naples, from the States of the Church; and Sardinia intervening to complete the revolution, the whole of Italy and Sicily, except Rome and its vicinity and Venetia, was combined in a united realm, which in 1861 was proclaimed as the kingdom of Italy, with Victor Emmanuel as its sovereign, the temporal power of the Pope being secured by French troops stationed in Rome. In the war which broke out in the spring of 1866 between Prussia and Italy combined on the one side, and Austria on the other, the Italian invasion of Venetia was repulsed in the battle of Custozza (June 24); but the Austrians, suffering heavy reverses from the Prussians, ceded Venetia to the Emperor of France, by whom its destiny was put to the vote of its inhabitants. Their vote being in favor of union with Italy, the province was accordingly joined to it. There was still one part of the Italian territory not included in the kingdom of Italy, namely, the Papal States, where the Pope continued to maintain his temporal authority under the protection of French troops. According to a convention concluded between France and Italy, Sept. 15, 1864, these troops were to be withdrawn in the course of the year 1866. This was, indeed, actually done, but their place was taken by a corps (the Antibes legion) levied in France and commanded by the French general Dumont, whom Napoleon sent in July, 1867, for the purpose. The protestations of the Italian government against this infringement of the spirit of the convention of 1864 were of no avail, and the convention was still further violated by a renewed direct intervention of Napoleon in the Papal States. On the outbreak of the Franco-Prussian War the French troops were withdrawn, and after the fall of the empire the Italian government occupied the Papal States (September, 1870), soon after which they were annexed to the kingdom of Italy. While the Pope was thus deprived of his temporal dominions, his spiritual independence was guaranteed. In 1871 the seat of government was removed to Rome from Florence (having until 1865 been at Turin). In 1878 Victor Emmanuel, the first king of united Italy, died, and was succeeded by his son Humbert, who, being assassinated in 1900, was succeeded by his son, Victor Emmanuel III. Later Italy has been in alliance with Germany and Austria-Hungary, the three powers having in view the preservation of the peace of Europe, but this Triple Alliance has been affected by a more friendly under-

standing with France. The acquisition of territory in Africa was checked by the war with Abyssinia, the disastrous defeat at Adowa leading to the acknowledgment of that kingdom's independence. As a consequence, Crispi was succeeded by Rudini as prime minister.

Itasca Lake (ī-tas'kä), in Beltrami and Cass counties, Minn.; first seen by William Morrison, a fur trader, in 1804; was explored by Henry Rowe Schoolcraft in 1832. It is the first considerable gathering of the furthermost streams which form the Mississippi, one of these being in volume entitled to be called the young Mississippi; the lake therefore is justly considered the source of the great river. The so-called "Glazier Lake" of some maps is merely an old bay of it partially settled up, and the claim of William Glazier to have discovered the "true source" has no foundation.

Itch, a popular name for scabies; a disease arising from the irritation produced by the presence in the parts affected of the itch mite and its ova. The animal burrows chiefly between the fingers, on the front of the forearm, on the abdomen, and the inside of the thighs.

Ithaca (ith'ä-kä), now THIAKI, one of the Ionian Islands, on the W. of Greece, between the mainland and Cephalonia, 17 miles long, and not above 4 broad. It is rugged and uneven, and divided into two nearly equal parts connected by a narrow isthmus. The inhabitants are industrious agriculturists and mariners, and build and fit out a considerable number of vessels. They seem to be of pure Greek race, and the women are famed for their beauty. Ithaca was the royal seat of Ulysses, and is minutely described in the Odyssey. Schliemann made important excavations, and identified several sites mentioned by Homer. Vathi, the modern capital, trades largely in oil, wine, raisins, and currants, and has a population of about 6,000. That of the island is about 11,000.

Ithaca, a city and county-seat of Tompkins co., N. Y.; on both sides of Cayuga Lake, and on the Lackawanna and the Lehigh Valley railroads; 70 miles S. E. of Rochester. It derives water power from Fall creek; has a number of beautiful cascades in its vicinity; and manufactories of autophones, glass, typewriters, drop forgings, calendar clocks, firearms, salt, and other commodities. The city is best known as the seat of CORNELL UNIVERSITY (*q. v.*) and the Cascadilla Preparatory School; and also as a popular summer resort. There are 2 National banks, trolley connection with East Ithaca, large farming trade with Tompkins, Tioga, Cortland, and Seneca counties; and an assessed property valuation exceeding $7,000,000. Pop. (1890) 11,079; (1900) 13,136; (1910) 14,802.

Ithamar (ith'ä-mär), the fourth son of Aaron, consecrated to the priesthood. (Ex. vi 23; Num. iii: 2, 3.) His posterity took charge of the tabernacle in the wilderness. (Ex. xxxviii: 21; Num. iv: 28.) Some of this line, namely, Eli, Ahitub, Ahiah, Ahimelech, and Abiathar, held the office of high priest, but under Solomon it reverted to the family of Eleazar. (I Kin. ii: 7.)

Ithome (ē'thō-mē), a mountain of Greece, in Messenia, 25 miles N. W. of Kalamata, 3,865 feet high. On its S. slope are the remains of a village, which in ancient Greece was the stronghold of the Messenians against the Lacedemonians. The first Messenian war ended with the fall of Ithome, 724 B. C.

COIN OF ITHACA.

Ithonus (ith'ō-nus), in classic Greek fable, the son of Deucalion and King of Thessaly, reported to have discovered the fusion of metals, and the art of coining money.

Itinerary, a list of stations or places on the route between two important localities, together with the distances between them. Some ancient itineraries are of importance to geographers. Of these the most important are the Antonine Itineraries, including the Itinerarium Provinciarum, or a list of the routes through the Roman provinces of Europe, Asia, and Africa; and the Itinerarium Maritimum, exhibiting the most frequented tracks along the coasts and at sea; and the Jerusalem Itinerary (Itinerarium Hierosolymitanum), made by a Christian in 333 for the use of travelers from Burdigala (Bordeaux) to Jerusalem.

Itinerary, in the Roman ritual, a form of prayer intended for the use of clerics when traveling, and, for their convenience, placed at the end of the breviary. The itinerary consists of the canticle *Benedictus*, with an antiphon, prayer, and two collects. Itineraries are not found in the older brevaries; but Gavantus mentions an ancient pontifical with an itinerary for the use of prelates rather longer than that at present employed.

Ito, Marquis Hirobumi, a Japanese statesman; born in the province of Choshu, in 1840. His first visit to Europe was made secretly, and he was strongly impressed with the results of civilization in the Western world. In 1871 he visited the United States for the purpose of examining the coinage system, and on his return to Japan

was successful in establishing a mint at Osaka. In 1878 he was transferred from the office of Minister of Public Works to the Home Office. In 1879–1880 he again visited foreign countries and became so imbued with German doctrines and sentiments that he was called the "Japanese Bismarck." He became prominent in the Japanese cabinet in 1886 and made many reforms. He made several visits to the United States and European countries to study government and banking systems; was four times premier; drafted the Constitution of Japan; established the gold standard; dictated the terms of peace with China and Russia; was governor-general of Korea in 1905-1908; created a prince in 1906; was several times murderously attacked; and was assassinated by a native Korean while visiting Harbin, Manchuria, Oct. 26, 1909.

Iturbide, Augustin de (ē-tör'bē-dā), a Mexican soldier; born in Valladolid, Mexico, in 1787. On the breaking out of the revolutionary troubles in Mexico he joined the royalist party and displayed such valor and ability that in 1815 he rose to the chief command of the army, but latterly went over to the other side, quickly bore down all opposition, and became so popular that he proclaimed himself Emperor of Mexico in 1822. His reign was full of trouble and came to an end in less than a year by his abdication. Congress granted him a yearly pension on condition of his leaving the country, and he resided in Leghorn about a year, when he made an attempt to recover the crown. He landed with but a single attendant, and was arrested and shot, in Padilla, July 19, 1824. His grandson was adopted as his heir by the unfortunate Emperor Maximilian.

Itys (it'is), in Greek fable, the son of Tereus, whom his mother, Procne, killed and served at table.

Itzibu, Itzebu, Itziboo, or **Itchebo** (its'ä-bö), a Japanese monetary unit of account. It is a silver coin, value varying from 32 to 35 cents. It is a thin, oblong plate, with square corners. Its use is now dying out, owing to the introduction into Japan of the decimal system.

Ivan (ē-wan'), the name of two grand-dukes and four czars of Russia. The best known, IVAN IV. (1530–1584), commonly called Ivan the Terrible, reigned from 1533, and did much for the advancement of his country in arts and commerce, as well as for its extension by arms. He was the first Russian sovereign to be crowned as Czar. He subdued Kazan and Astrakhan, and from his reign dates the first annexation of Siberia. He concluded a commercial treaty with Queen Elizabeth after the English had discovered (1553) the way to Archangel by sea. But his hand fell with merciless cruelty upon the boyars of his kingdom, and upon some of his towns, as Moscow, Tver, and Novgorod. In the last named some 60,000 people were slain in six weeks. This was, however, during the third period of his reign. The first marks the time during which he was under his mother's guardianship; and the second the era of commercial enterprise and territorial consolidation. Ivan died of sorrow for his son, whom three years before he had slain in a mad fit of rage.

Ives, Frederic Eugene, an American inventor; born in Litchfield, Conn., Feb. 17, 1856; received a public school education; was director of the photographic laboratory at Cornell University in 1874–1878. His inventions include the process of half-tone photo-engraving (1878); the three-color printing process in the typographic press; etc. He is the author of "Isochromatic Photography with Chorophyll" (1886); "A New Principle in Heliochromy." (1889); etc.

Ivory, the osseous matter of the tusks of the elephant, and of the teeth or tusks of the hippopotamus, walrus, and narwhal. Ivory is esteemed for its beautiful white or cream color, its hardness, the fineness of its grain, and its susceptibility of a high polish. It is used as a material for knife-handles, pianoforte keys, etc. The ivory of the hippopotamus is preferred by the dentist, being free from grain and much harder and of a purer white than that of the elephant. The shavings and saw-dust of ivory may by burning be converted into a black powder, used in painting, named ivory black. Ivory may be stained or dyed; a black color is given it by a solution of brass and a decoction of logwood; a green one by a solution of verdigris; and a red by being boiled with Brazil wood in lime-water. The use of ivory, chiefly for ornamental purposes, was well known in early ages. Among the Greeks it was employed for statuary purposes.

The world's annual consumption of ivory is estimated at about 1,500,000 pounds, valued at $4,500,000. To supply this amount 70,000 elephants must be killed, the annual consumption in Sheffield alone requiring the slaughter of 22,000 animals. At this rate, unless legislation interferes to put a stop to such wholesale destruction, elephants will soon become extinct. Africa supplies the great bulk of ivory, the Indian wild elephant having become so scarce of late years that India is now obliged to import a considerable quantity of ivory. A vast amount of fossil ivory is also exported from Eastern Siberia to various countries. African ivory fetches a higher price than any other, being dense in tex-

ture, susceptible of a higher polish and not so liable to turn yellow when exposed to the light as the Indian kind. The quality varies greatly, the rule being that the warmer the region, the finer is the ivory found there, though the finest tusks are generally met with at some distance from the equator. The tusks of a full grown elephant seldom measure over six feet and weigh from 100 to 200 pounds. The tusk is usually solid for about half its length, the base being quite thin and, therefore, of little use for commercial purposes. Only from the upper portion can billiard balls and the bulkier objects be made.

Ivory Black, a name for burnt bone, which forms a mixture of charcoal and phosphate of lime. Like other forms of animal charcoal, it is very effective in depriving certain substances of their color and odor. When ivory black is prepared by calcining the shavings and dust of ivory, and then ground and levigated on a porphyry slab, it gives the velvety black material which forms the principal ingredient of the ink used in copper plate printing.

Ivory Coast, a part of the N. coast of the Gulf of Guinea, West Africa, embraces the districts between Cape Palmas and the river Assini. Its W. portion belongs to Liberia; its E., now counted as part of the Gold Coast, is shared between Great Britain and France. The name bears no political meaning.

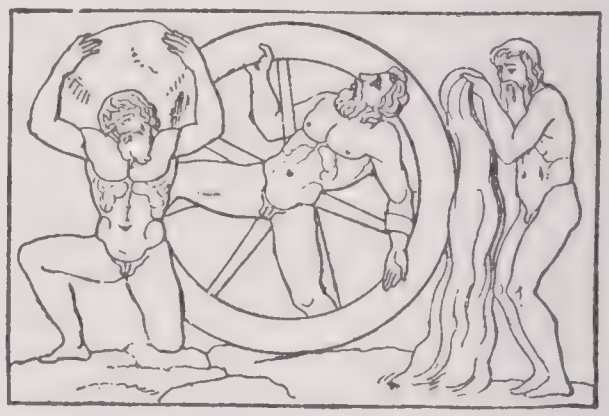
Ivory Palm (*Phytelephas macrocarpa*), a low growing, palm-like plant, order *Pandanaceæ*, native of the warmer parts of South America. It has a creeping caudex or trunk, terminal pinnatifid leaves of immense size, male and female flowers on different plants, and fruit in the form of a cluster of drupes weighing about 25 pounds when ripe. Each drupe contains six to nine seeds, as large as a hen's egg, the albumen of which when ripe is close-grained and very hard, resembling the finest ivory in texture and color. It is therefore often wrought into buttons, knobs for doors or drawers, umbrella handles, and other articles, and is called vegetable ivory. The seeds are also known as corozo nuts, and are imported in considerable quantities.

Ivory Vegetable. See Corozo Nut.

Ivrea (ē-vrā′ä), a town of Piedmont, Italy, on an eminence at the S. end of the Val d'Aosta; 38 miles N. E. of Turin. Founded in accordance with an injunction contained in the Sibylline Books about 100 B. C., it has a cathedral which is supposed to occupy the site of a temple to Apollo.

Ivry (ē-vrē′), a village of over 1,100 inhabitants in the French department of Eure. On the Plain of Ivry was fought, March 14, 1590, the famous battle between Henry of Navarre and the armies of the League.

Ivy, a climbing plant of the genus *Hedera* (*H. Helix*), natural order *Araliaceæ*. The leaves are smooth and shining, varying much in form, from oval entire to three and five lobed; and their perpetual verdure gives the plant a beautiful appearance. The flowers are greenish and inconspicuous, disposed in globose umbels, and are succeeded by deep green or almost blackish berries. *H. Helix* (the common ivy) is found throughout almost the whole of Europe and in many parts of Asia and Africa. It is plentiful in Great Britain, growing in hedges woods, on old buildings, rocks, and trunks of trees. A variety, called the Irish ivy, is much cultivated on account of the large size of its foliage and rapid growth. Several varieties of ivy are grown in American gardens. The ivy attains a great age, and becomes several inches thick. The wood



SISYPHUS, IXION AND TANTALUS.

is soft and porous, and when cut into very thin plates may be used for filtering liquids. In Switzerland and the S. of Europe it is employed in making various useful articles. The ivy has been celebrated from remote antiquity, and was held sacred in some countries, as Greece and Egypt. Its medicinal properties are unimportant. Chinese ivy (*Parechites Thunbergii*) is a climbing shrub with privet-like leaves and sweet scented flowers.

Ixia, in botany, a genus of *Iridaceæ*. It consists of beautiful Cape bulbs, with spikes of showy flowers. *I. viridiflora* has large sea-green flowers, with black markings. It is from the Cape of Good Hope.

Ixion (iks-ī′on), a treacherous King of Thessaly, who, having basely destroyed his father-in-law, was so execrated by his subjects that Jupiter in pity took him to heaven; but Ixion becoming enamored of Juno, Jupiter hurled him with his thunder into the infernal regions and had him chained to a wheel in perpetual motion, his punishment thus being eternal.

Ixtaccihuatl (ēts-täk′sē-wat-el), a high mountain in Mexico, estimated height 16,-

077 feet, though some authorities pronounce it higher than Popocatepetl.

Ixtle, a Mexican fiber, probably the production of a species of the pineapple family.

Izabal, a lake in Guatemala; also the name of a district in the same country. Area, 4,500 square miles; pop. (1900) est. 8,000.

Izard, Ralph, an American patriot; born in 1742. He was very wealthy and during the Revolution pledged his estate to buy ships of war. He was the first United States Senator from South Carolina. He died in 1804.

Izdubar (iz′dū-bar), a hero of early Babylonia, perhaps a real personage, but latterly converted into a deity and worshiped. In the cuneiform inscriptions feats similar to those of Hercules are ascribed to him.

Izmailov, Alexander Efimovich (ēz-mä-ēl′ov), a Russian poet; born in 1779. His poetry and fables are very popular in Russia. He died in 1831.

J

j, the 10th letter and the 7th consonant of the English alphabet. The character j designates very different sounds in the different languages. In English it has the same sound as g in genius. This sound is called a soft palatal sound, that of ch as in charity being the hard palatal. In French it is always sounded like the French g before e and i; in German it has the sound of the English y in you; in Italian it is always a vowel (long i), and the character j is now little used by Italian printers except at the end of words for ii; in Spanish it is guttural, a little softer than the German ch in *ach*. How nearly the sounds which are expressed by j are related has been shown in the article G; and in the article I it is mentioned that i before another vowel naturally becomes the German j. (For other observations also relating to j see the article I.) Jacques Pelletier of Mons is said to have first placed the j at the beginning of words which began with this consonant in his "French Grammar" (1550). Gille Beys, printer in Paris, imitated him in 1584; but the Dutch were long the only people that used it systematically in printing. In regard to the separation of words beginning with the two letters in dictionaries, the editors of the "French Encylopédie," printed in 1765, did not dare to make it; and English dictionaries have hardly yet given up the practice of mixing together i and j, as well as u and v. The other nations adopted it from the French. The Romans, in inscriptions and legends of medals, wrote all words which we write with a j, as Jupiter, Justinus, with an i, as Iupiter, Iustinus. The French and English sounds of j were unknown to the Greeks and Romans.

Jabalpur (jub-al-pör′), chief town of Jabalpur district, Central Provinces, India. Standing at the junction of the East Indian and Great Indian Peninsula systems, Jabalpur is one of the most important railway stations in India. It is the second commercial town in the Central Provinces, has a trade worth about $10,000,000 annually, and manufactures cotton, tents, and carpets. Pop. (1901) 90,316. The district of Jabalpur has an area of 3.918 square miles, and a population of 687,233.

Jablochkoff (yä-bloc*h*-kof′) **Candle** (named for P. Jablochkoff, a Russian telegraph engineer, 1847–1894), one of the earliest forms of the electric arc light, perfected in Paris in 1878. Its advantage was chiefly its simplicity; its disadvantages were the singing noise it produced, and its liability to extinction without provision being made for automatic relighting, which caused the extinction of any individual lamp to be equivalent to the permanent extinction of all the arc lamps in a circuit, as arc lamps are almost always set in a series. Its interest is now chiefly historic.

Jacamar (jak′ä-mar), the name generally given to the birds ranked under *Galbulinæ*, a sub-family of *Alcedinidæ* or kingfishers. The jacamars have the bill less stout than the typical *Alcedinæ*; their body also is more slender; the tail long; the toes either in two pairs, or two before and one behind, the anterior ones being united. They are bright-colored birds, generally with a good deal of green in their plumage. They are found in the tropical parts of South America and in the West Indies, breeding in cavities of trees, and sallying forth from a branch or spray to capture the insects on which they feed. Sometimes elevated into a family, *Galbulidæ*.

Jacana (jak-ä′nä), a genus of grallatores (*Parra* of Linnæus), family *Rallidæ*, distinguished by the extraordinary length of their toes and their spine-like claws, especially that of the hinder too. They are very light birds; and the wide surface over which their toes extend enables them the more easily to procure their food, consisting of worms, small fishes, and insects, by walking on the leaves of aquatic plants which float on the water. Various species of the jacana, which in contour and habit resemble the English moor hen, are spread over the tropical regions both of the Old and New World.

Jacaranda Wood (jak-a-ran′da), a very hard, heavy, brown wood, also called rosewood — though not the true rosewood of commerce — from its faint, agreeable smell of roses. It is brought from South America,

and is produced by several trees of the genus *Jacaranda*, of the natural order *Bignoniaceæ*. Several species of this genus are called caroba in Brazil, and are there accounted anti-syphilitic. Several species of the nearly allied genus *Tecoma* also have an extremely hard wood, as *T. pentaphylla*, a native of the Caribbean Islands. The Brazilian Indians make their bows of the wood of *T. toxiphora* or *Pao d'arco*.

Jacchus (jak'us or yak'us), a name given to the sapajous of the genera *Hapale* and *Midas*, also commonly known as marmozets, ouistitis, and tamarins. They are monkeys of small size, with short muzzle, flesh col-

JACANA OF SOUTH AMERICA.

ored face, and round head. The five fingers are armed with claws, except the thumbs of the posterior extremities, which have nails; fur very soft; tail full and handsome. Length of body about eight inches; tail 11. General color olive-gray; head and shoulders nearly black; the tail and lower part of the back are annulated with pale gray; and two tufts of pale hair grow round the ears. They are squirrel-like in their habits, and omnivorous; feeding on roots, seeds, fruits, insects, snails, and young birds. Natives of Guiana and Brazil.

Jacitara (jas-it-ā'rä), in botany, *Desmoncus macracanthos*, a fine palm, 50 or 60 feet long, with a stem as thin as a cane. It grows along the Amazon and the Rio Negro.

Jack, a name used as the equivalent of John, one of the most common of Christian names, but it is not a little curious that it is really the French *Jacques* (till the 17th century pronounced as a dissyllable), and so through the Latin *Jacobus* and Greek *Jakobos* from the Hebrew *Ya'aqób*, Jacob, Others, however, explain it as a shortened form of *Jankin*, an old diminutive of *Johan*, *Jchan*, or *John;* from the Northern forms of which again, *Johnkin* or *Jonkin*, we have Jockey and Jock.

Jack, a coat of mail; defensive body armor worn by troops from the 14th to the 17th century inclusive. It consisted of a leathern surcoat worn over the hauberk, and sometimes quilted like a gambeson.

Jack, or **Jaca** (*Artocarpus integrifolia*), a tree of the same genus with the bread fruit, a native of the East Indies. It is a larger tree than the bread fruit, and has larger fruit.

Jackal, the *Canis* (*Sacalius*) *aureus*, an animal of the family *Canidæ*, and presenting a close affinity to the dog. It is yellowish-gray above, whiter underneath, the tail is bushy and at its extremity tipped with black. The jackal inhabits the warm parts of Africa, Southern Asia, and Europe. All who have lived in the East must have heard its unearthly yells suddenly breaking in upon the silence of night. It hunts in packs. It is not, consciously at least, the "lion's provider." It is not generally on living animals that it feeds, but on carrion. It is therefore improbable that, as a rule, a troop of jackals hunts down prey, and then the lion, presenting himself, takes it from them. More probably he hunts it down, and they consume what he leaves. There is another species, *C. mesomelas*, the black-backed jackal. It is found at the Cape of Good Hope.

Jackass Penguin (*Eudytes demersa*), a species of penguin which rises to the surface and again dives with great rapidity, so that according to Darwin it might be mistaken for a fish leaping for sport.

Jack Daw, or **Daw,** in ornithology, *Colœus* or *Corvus monedula*, the smallest of crows, being but 13 inches in length. The general color is black, with a grayish shade on the margins of the feathers, the back and wings purplish; the crown of the head is glossy blue-black, forming a cap; the neck hoary-gray, the bill and feet black, the eye bluish-white. Both sexes colored alike. The bird breeds in towers and old buildings, also in hollow trees. Eggs four to seven, more bluish than those of ordinary crows, and blotched with brown spots.

Jack-o'-Lantern. See IGNIS FATUUS.

Jack Rabbit, a large rabbit or hare found in the S. and W. of the United States.

Jackscrew, a lifting implement which acts by the rotation of a screw in a threaded socket.

Jackson, a city and county-seat of Jackson co., Mich.; on the Grand river, and several lines of railroads; 76 miles W. of Detroit. It is the trade center and distributing point for coal, oil, and farming implements for South Central Michigan; and has manufactories of machinery, corsets, chemicals, oil stoves, glass, paper and

refrigerators. The city contains the State prison; derives large power for manufacturing from the river; has the Holly system of waterworks, electric light and street railway plants, a National and other banks, daily, weekly, and monthly periodicals, and an assessed property valuation exceeding $11,000,000. Pop. (1890) 20,798; (1900) 25,180; (1910) 31,433.

Jackson, a city and county-seat of Madison co., Tenn.; on the Forked Deer river, and the Illinois Central, the Mobile and Ohio, and several other railroads; 150 miles S. W. of Nashville. It is the farming trade center for a region having a population of 175,000, and yielding an annual trade of $2,500,000; is an important cotton market; and has manufactories of engines and boilers, bicycles, cottonseed oil, lumber, machinery, and woolen mills. Jackson is the seat of the Southwestern Baptist University, the Memphis Conference Female Institute, St. Mary's Academy, and Lane College. There are 2 National banks, daily, weekly, and monthly periodicals, a waterworks plant, owned by the city and valued at $400,000; and an assessed property valuation of over $2,500,000. Pop. (1890) 10,039; (1910) 15,779.

Jackson, a city, capital of the State of Mississippi, and county-seat of Hinds co.; on the Pearl river and several important railroads; 40 miles E. of Vicksburg. It contains the State Lunatic Asylum, State Institution for the Deaf and Dumb, State Law Library, State prison, Milsope College for Men, Belhaven College for Women, a National bank. It is the farming and cotton raising trade center for four counties, and besides a variety of industries connected with cotton, it has iron foundries, brick and lumber yards, railroad repair shop, fertilizing factories, and agricultural implement factories. Jackson is lighted by electricity; has an extensive trade, especially in cotton, through the port of New Orleans; and has an assessed property valuation of about $4,500,000. Pop. (1890) 5,920; (1910) 21,262.

Jackson, the name of a fort in Louisiana, on the Mississippi river, about 80 miles below New Orleans. During the Civil War, the place was strongly fortified by the Confederates in conjunction with the sister batteries of Fort St. Philip on the opposite side of the river, which latter was obstructed so effectually by hulks and chains as to close the passage. From April 20 to 25, 1862, the fleet under command of Commodore Farragut engaged both forts in a severe artillery duel, passed them with but comparatively small loss, and breaking through the river obstructions succeeded in reaching New Orleans.

Jackson, Andrew, an American statesman and soldier; 7th President of the United States; born in the Waxhaw Settlement, N. C., March 15, 1767. His father died before his birth. His education was very limited, and he was not given to study. After serving a short apprenticeship with a saddler, at the age of 18 he entered a law office in Salisbury to prepare for the law. His practice was large and prosperous. In 1791 he married Mrs. Rachel Robards. Tennessee was admitted to the Union in 1796, and Jackson was sent as its Representative to Congress. He was elected to the Senate in 1797, but resigned his seat in 1798 to become judge of the Tennessee Supreme Court, where he served six years. When the War of 1812 broke out, he offered his services to Madison, then President, with 2,500 volunteers of Tennessee militia, of which he was commander-in-chief. In 1814 Jackson was made a Major-General and put in command of the Department of the South. He asked permission to drive the British out of Florida, where, by Spanish permission, they had established a base of operations. Failing to receive an answer because of the capture of Washington by the British, Jackson proceeded on his own responsibility. He repulsed the enemy at Mobile, took Pensacola by storm, and then marched to New Orleans, where he fortified the city. A force of 12,000 of Wellington's veterans, relieved by the victory of Waterloo for American service, landed below the city. Jackson had 6,000 men to meet them, but they were well protected by breastworks. The British general, Packenham, resolved to take the defenses by storm. Jackson's victory was complete. The British were repulsed in half an hour, with a loss of 2,600 men, Packenham himself being among the slain. This great and decisive victory, achieved with but the loss of eight men, coming in the wake of several reverses to the American cause, made Jackson the hero of the nation. When, in 1819, the United States purchased Florida, Jackson was appointed governor. In 1823 he was elected to the United States Senate. In 1824 he was nominated by the Federalist and by the Republican convention for the presidency. The election went to the House of Representatives, which chose John Quincy Adams. But in 1828 Jackson was again nominated, beating Adams by a large electoral and popular majority. His administration was memorable and stormy. He introduced the theory that "to the victors belong the spoils," and made wholesale removals of Federal officials to make room for his own appointees. South Carolina, under the lead of John C. Calhoun, the Vice-President, attempted to nullify the tariff law, calling a convention Nov. 19, 1833, which declared

the law unconstitutional. Jackson sent a naval force under Farragut to Charleston harbor. He attacked the United States Bank, opposing the renewal of its charter, which would expire in 1836. He vetoed the bill renewing the charter. He was reëlected in 1832 by largely increased majorities. He succeeded in securing the removal of

ANDREW JACKSON.

the public funds from the United States Bank to various State banks. After his second term of office as President, Jackson lived mostly in retirement at "The Hermitage" near Nashville, where he died June 8, 1845.

Jackson, Charles Thomas, an American scientist; born in Plymouth, Mass., June 21, 1805; was graduated at Harvard Medical College in 1829, and practised in Boston; became State geologist for Massachusetts and Maine in 1836, and land-surveyor and State geologist for Rhode Island in 1839; appointed to survey the Lake Superior copper-mining district in 1847, and spent two years in this work. He claimed to have been the first to point out, in 1832, the applicability of electricity to telegraphic use, and also claimed to have been the discoverer of the anæsthetic effects of the inhalation of ether in 1842; received the Monthly prize of 2,500 francs from the French Academy of Sciences in 1852. He published a "Manual of Etherization, with a History of its Discovery" (1861); "Reports on the Geology of the Public Lands belonging to the Two States of Massachusetts and Maine" (1857–1858); "Report on the Mineral Lands of the United States in Michigan" (1849); etc. He died in Somerville, Mass., Aug. 28, 1880. See ANÆSTHESIA.

Jackson, Dugald Caleb, an American inventor; born in Kennett Square, Pa., Feb. 13, 1865; was graduated at the Pennsylvania State College in 1885, and studied engineering at Cornell University; became connected with Edison interests in 1889; later was made chief engineer of the central district of the Edison General Electric Company; designed and built many large lighting plants and electric railways. He is the author of "A Text-book on Electricity and Magnetism and the Construction of Dynamos" (1893); "Electricity and Magnetism," a series of lessons (1895); joint author of "Alternating Currents and Alternating Currents Machinery" (1896); etc.

Jackson, Edward Payson, an American educator; born in Erzeroum, Turkey, March 15, 1840; son of Rev. William C. Jackson; was educated at Amherst College; served in the 45th Massachusetts Volunteers in the Civil War. He became master of the Boston Latin School in 1877. His publications include "Mathematical Geography"; "A Demigod" (1886); "The Earth in Space" (1887); joint author of "Conduct as Fine Art" (1892); etc. He died in 1905.

Jackson, Helen Maria Fiske Hunt, an American author; born in Amherst, Mass., Oct. 18, 1831; received an academic education; went with her husband to Colorado Springs, Colorado; became actively interested in the treatment of the Indians by the government, and strove to better their condition; was appointed a special commissioner to investigate the condition of the Mission Indians of California in 1833, and studied the history of the early Spanish missions. Her published works include: "Verses," "Bits of Travel," "Bits of Talk about Home Matters," "Bits of Talk for Young People," "Bits of Travel at Home," "Nelly's Silver Mine," "The Story of Boon," "Letters from a Cat," "A Century of Dishonor," referring to the Indians, "Mammy Tittleback and her Family," "The Training of Children," "The Hunter Cats of Connorloa," "Ramona," "Zeph," "Glimpses of Three Coasts," "Sonnets and Lyrics," "Between Whiles"; also "Mercy Philbrick's Choice" and "Hetty's Strange History" contributed to the "No-Name Series." The stories published under the pen name of Saxe Holm have been attributed to her. She died in San Francisco, Cal., Aug. 12, 1885.

Jackson, Henry, an English novelist; born in Boston, Lincolnshire, April 15, 1831. His novels: "A Dead Man's Revenge"; "Gilbert Rugge" (1866); and "Argus Fairburn" (1874), had much vogue. He died in Hampstead, May 14, 1879.

Jackson, Howell Edmonds, an American jurist; born in Paris, Tenn., April 8, 1832. He was graduated at West Tennessee College in 1848; was elected United States Senator from Tennessee in 1881; appointed a United States Circuit Court judge

in 1886, and a justice of the United States Supreme Court in 1893. He died in West Meade, Tenn., Aug. 8, 1895.

Jackson, Mercy Bisbee, an American physician; born in 1802. She practised medicine 33 years, was professor in the medical school of Boston University, and advocated woman suffrage. She died in 1877.

Jackson, Sheldon, an American educator; born in Minaville, N. Y., May 18, 1834; was graduated at Union College in 1855, and at Princeton Theological Seminary in 1858; ordained in the Presbyterian Church; was missionary to Western Wisconsin and Southern Minnesota in 1859–1869; Superintendent of Missions in Wyoming, Colorado, New Mexico, Arizona, Utah, and Montana in 1870–1882; appointed to Alaska in 1877. He was made United States general agent for Alaska in 1885; introduced reindeer into that territory in 1891; special United States agent to influence Laplanders to colonize in Alaska in 1898. He is the author of "Alaska and Missions on the North Pacific Coast"; (1880); "Education in Alaska" (1881); annual reports on "Education in Alaska" from 1886; and annual reports on the "Introduction of Domestic Reindeer into Alaska" (1891–1901); etc. He was moderator of the General Assembly of the Presbyterian Church in 1897. He died May 2, 1909.

Jackson, Thomas Jonathan, an American military officer; born in Clarksburg, Va., Jan. 21, 1824; was graduated at the United States Military Academy in 1846; served through the Mexican War with great distinction, winning promotions more rapidly than any other officer of his grade during that war. When the Civil War began, he was commissioned colonel in the Virginia forces; was placed in command of the Virginia brigade, which afterward became famous; met the advance of General Patterson at Falling Waters on July 2, 1861, gave the National force a decided check, and captured a number of prisoners. Soon after he was commissioned Brigadier-General. In the first battle of Bull Run he won his new name "Stonewall" when Gen. Bernard E. Bee, in the crisis of the fight, shouted: "See, there is Jackson standing like a stonewall; rally on the Virginians!" In recognition of his gallantry he was promoted Major-General and placed in command of the district that included the Shenandoah valley and the section of Virginia N. W. of it. During the winter he drove the National forces out of his district. In March, 1862, he fell back before Banks' army of 35,000 men, and Banks reported him "in full retreat from the valley" and started a column to cross the mountains and attack Johnston in flank, as he was falling back from Manassas, when Jackson suddenly

turned, marched 18 miles in the morning, and with 2,700 men fought at Kernstown, near Winchester, 8,000 of the National troops, and though defeated, accomplished his purpose in recalling the column which was moving on Johnston's flank, quietly moved up the valley and took a strong position in Swift Run Gap. Then followed in rapid succession the uniting of Ewell's division with his at Luray, the driving in of Banks' flank at Front Royal, the cutting of his retreating column at Middletown, and on May 25, the rout of Banks' army from the heights of Winchester.

He was about to cross the Potomac into Maryland in pursuit of Banks when he learned that Fremont from the W., and Shields, the head of McDowell's column, from the E., were marching to form a junction in his rear at Strasburg. He at once put his army in motion, and by forced marches reached the point of danger in time to hold Fremont in check with one hand and Shields with the other till his whole army, prisoners, and immense wagon trains loaded with captured stores passed on in safety. He then moved leisurely up the valley, burning the bridges over the Shenandoah to prevent a junction between Fremont and Shields.

He next hastened to Richmond, where he united with General Lee in attacking McClellan. His skill in the Seven Days' battles, his defeat of Pope's advance under Banks at Cedar Run, his flank march to Pope's rear, and the pertinacity with which he held him at bay along the Warrenton road till Lee could come up with Longstreet and drive him into the fortifications around Washington, his capture of Harper's Ferry with 11,000 prisoners, 13,000 stand of small arms, 73 pieces of artillery, and large quantities of provisions and stores of every description, and his conduct on the field of Sharpsburg, all added greatly to his fame.

He was promoted Lieutenant-General in October, 1862; and held the extreme right of Lee's army at Fredericksburg, where he repelled the attack of Franklin. Toward the end of April, 1863, he was sent with 22,000 men to make a march to Hooker's flank and rear. This was brilliantly executed and Jackson routed that flank of Hooker's army, and was proceeding to cut him off from his line of retreat and take a position where Hooker would have been compelled to attack him in position, when in returning from one of those bold reconnoissances which he so frequently made, his party was mistaken for the enemy and fired on by his own men and he was very severely wounded. His left arm was amputated, his other wounds dressed, and he was improving hopefully, when pneumonia suddenly developed and caused his death in Guinea Station, Va., May 10, 1863.

Jackson, William, an English musician; born in 1730. After some years in London, he in 1777 became organist of the cathedral. He published many songs and canzonets, besides sonatas, dramatic pieces, etc., some of his compositions having great vogue in their day. He died July 12, 1803.

Jacksonville, a city and county-seat of Duval co., Fla.; on St. Johns river, and the Plant System, and other railroads; 139 miles S. of Savannah. The city is about 30 miles from the coast; and has regular steamer communication with all points on the St. Johns river, and also to Charleston, New York, and Boston, and sailing vessel communication with various foreign ports. The city is a farming, fruit growing, and lumbering trade and jobbing center for Florida and Southern Georgia, a region yielding an annual trade of over $40,000,000; exports annually over 115,000,000 feet of lumber; and has valuable phosphate interests. Jacksonville is highly esteemed as a winter resort, especially by people from the Northern and Eastern States. It is the seat of St. Luke's Hospital, the largest in the State, and the general offices of the Florida Central and Pensacola, and the Jacksonville, Tampa, and Key West railroads. The city has 3 National and several State and private banks, and an assessed property valuation of about $13,500,000. During the American-Spanish War, Jacksonville was used extensively as a point of embarkation of troops and supplies for Cuba, and as a coaling station. Pop. (1890) 17,201; (1910) 57,699.

Jacksonville, a city and capital of Morgan co., Ill.; on the Wabash, Chicago and Alton, the Chicago, Peoria, and St. Louis, and the Jacksonville and St. Louis railroads; 34 miles W. of Springfield, the State capital. The city, which is popularly known as the "Athens of the West," is the seat of Illinois College, Illinois Female College, Jacksonville Female Academy, Illinois State Institutions for the Education of Deaf Mutes and the Blind, State Central Insane Hospital, Passavout Memorial and Our Saviour Hospitals, and the Whipple Academy for Boys. The city is the trade center for Morgan, Scott, and parts of Green and Cass counties; is largely concerned in the agricultural industry; has manufactories of woolen goods, candy, steel products, machinery, woven wire, pumps, and wind mills, boilers, brick and tile, paper, and flour. There are a National and other banks, daily, weekly, and semi-monthly periodicals, and an assessed property valuation exceeding $2,000,000. Pop. (1890) 12,935; (1900) 15,078; (1910) 15,326.

Jacmel (zhäk-mel'), a seaport on the S. coast of Haiti, 30 miles S. W. of Port au Prince. It has a good anchorage. Pop., estimated, 8,000.

Jacob, the son of Isaac and Rebecca, the grandson of the Jewish patriarch Abraham, and the twin but younger brother of Esau, was the father of 12 sons, from whom the 12 tribes of Israel were descended. He was the favorite of his mother, by whose advice he imposed upon his father and obtained his blessing, having before taken an advantage of Esau by purchasing his birthright. To avoid his brother's fury he fled to Padanaram, where he resided with his uncle Laban, whom he served 14 years for his daughters Leah and Rachel. He afterward returned to Canaan with great wealth, and a reconciliation took place between him and his brother Esau. His name was altered to Israel by an angel; whence his posterity have been called Israelites. He lived to the age of 147 years. He died in the land of Goshen about 1680 B. C.

Jacobabad, a town of Upper Sind, India. It has cantonments, a residency, and accommodation for the trade caravans from Central Asia. Here is the memorial tomb of Gen. John Jacob, commandant of the Sind Horse, who founded the place in 1847, and died here in 1858. Pop. (1900) est. 12,500, including cantonments.

Jacobean Architecture, a term applied to the later style of Elizabethan architecture from its prevailing in the time of James I. (Latin, *Jacobus,* James). It differed from the pure Elizabethan chiefly in having a greater admixture of debased Italian forms.

Jacobi, Friedrich Heinrich, a German philosopher and poet; born in Düsseldorf, in 1743. In 1779 he was appointed to a government office at Munich; retired during the early years of the French Revolution, to Wandsbeck and Hamburg; returned to Munich in 1804, and assisted in the organization of the Academy of Sciences, of which he became president in 1807. Jacobi's first work was a philosophical poem entitled "Waldemar." Among his other writings, chiefly devoted to the criticism of existing systems of philosophy, are "David Hume, or Idealism and Realism"; "Essay on the Doctrine of Spinoza"; "Letters to Fichte"; and "On Divine Things, and on Revelation." His expositions are distinguished by acuteness, and adorned by so remarkable a grace that his disciples have named him the modern Plato. He died in 1817.

Jacobi, Johann Georg, a German poet; brother of Friedrich; born in Düsseldorf, Sept. 2, 1740. His association with Wieland, Klopstock, Goethe, Herder, and "Father" Gleim, the poet and patron of poets, quickened his talent, and the verse that gives him such eminence among his country's minor bards was the result. "The

Summer Journey" and "The Winter Journey" are among the prettiest of this poet's pieces. He died in Freiburg, Jan. 4, 1814.

Jacobi, Karl Gustav Jakob, a German mathematician; born in Potsdam, Dec. 10, 1804. Jacobi excelled in analytical mathematics; his name is best known from his discovery of elliptic functions. Besides this he did most valuable work in connection with differential equations and the theory of numbers: his name is perpetuated in the theory of determinants. In 1829 he published his most celebrated work, "New Foundations of the Theory of Elliptic Functions." He died in Berlin, Feb. 18, 1851.

Jacobi, Mary Putnam, an American physician; born in London, England, Aug. 31, 1842. She graduated from the Woman's Medical College, Philadelphia; College of Pharmacy, New York; and the School of Medicine, Paris. After 1871 she practised in New York city. Among her works are: "The Value of Life"; "Hysteria, and Other Essays"; "Studies in Primary Education." She died June 10, 1906.

Jacobi, Moritz Hermann, a German physicist; born in Potsdam, Prussia, Sept. 21, 1801. He invented the process of electrotyping in 1839, and the application of electromagnetism as a motive power. He was a member of the Academy of Sciences and a Councilor of State. He died in St. Petersburg, March 10, 1874.

Jacobin Club (jak'ō-bin), a political organization which bore a prominent part in the French Revolution. It was formed by some distinguished members of the First Assembly, particularly from Brittany, where revolutionary sentiments ran high. They took at first the name of Friends of the Revolution; but, as at the end of 1789 they held their meetings in the hall of a suppressed Jacobin monastery in the Rue Saint Honoré, the name of Jacobins, at first familiarly given to them, was finally assumed by themselves. The history of the Jacobin Club is, in effect, the history of the Revolution. It contained at one time more than 2,500 members, and corresponded with more than 400 affiliated societies in France. The club of the Cordeliers, formed by a small and more violent party out of the general body of Jacobins, was reunited with the parent society in June, 1791, but continued to form a separate section within its limits. The Jacobin Club, which had almost controlled the First Assembly, was thus, during the continuance of the second, itself divided between two contending parties; though the name of Jacobins, as a political party, is commonly given to that section which opposed the Girondists or more moderate party in the club no less than in the Assembly. After the destruction of the latter under the Convention, the club was again exclusively governed by the more violent among its own members till the downfall of Robespierre. After that period it became unpopular; and its members having attempted an insurrection on behalf of the subdued Terrorists, Nov. 11, 1794, the meeting was dispersed by force and the club finally suppressed.

Jacobite, a term first applied in England to the party which adhered to James II. after the Revolution of 1688, and afterward to those who continued to maintain sentiments of loyalty toward the house of Stuart, and sought to secure the restoration of that family to the English throne. The unsuccessful rebellions of 1715 and 1745 in Scotland were brought about by the agency of the Jacobites. In Scotland the party maintained its strength till the failure of the rebellion of 1745 put an end to its political existence. It is said that some of the party carried on a correspondence with Charles Edward till his decease in 1787. The Cardinal of York, his brother, died in 1807; and it has been said that by his death the adhesion of the Jacobites, if any existed, was transferred to the reigning family as his next heirs. This, however, is an error; the royal house of Italy, and other families, intervening between the house of Brunswick and the crown of England, according to the strict rules of hereditary descent.

In ecclesiastical history, a Christian sect which arose during the 5th century and maintained that Christ had but one nature. They were thus named from Jacob Baradæus, Bishop of Edessa and apostle of the East, who restored the sect about 545. From this man, Mosheim remarks, as the second father of the sect, all the Monophysites in the East are called Jacobites. Baradæus died in 578. A small section of the Jacobites joined the Roman Catholics in the 17th century, but the majority remained firm in the faith of their ancestors. Riddle enumerates among the remains of Oriental sects or Christian communities existing in 1037, the Syrian Jacobites living under their patriarch at Antioch. Roger of Wendover mentions a new sect of preachers called Jacobites, because they imitated the life of the apostles, who sprang up in 1198, under the auspices of Pope Innocent III. They were mendicants and suffered great privations. Mosheim believes the sect ceased to exist soon after the Council of Lyons in 1274.

Jacob Omnium. See HIGGINS, MATTHEW JAMES.

Jacob Rifle, a weapon invented by Henry Jacob, an English general of the Sind Irregular Horse. The barrel of this musket is rifled by cutting in the interior four grooves of tolerable depth, each being about

the 8th part of the circumference of the interior of the barrel in breadth; or, in other words, equal to the lands in breadth. Though excellent shooting has been made with rifles grooved on Jacob's principle, the depth of the grooving has proved to be an objection, as it reduces the strength of the barrel unless it be made of great weight and thickness, and necessitates the formation of projections on the ball, besides rendering the rifle tedious to load.

Jacobs, Henry Eyster, an American clergyman; born in Gettysburg, Pa., Nov. 10, 1844. He was graduated at Pennsylvania College and Lutheran Theological Seminary. He held important professorships and after 1883 was dean of the faculty at Lutheran Theological Seminary. He wrote "Life of Martin Luther," "Elements of Religion," etc.

Jacobs, Joseph, an Australian author; born in Sydney, Aug. 29, 1854. He was graduated at St. John's College, Cambridge. He was editor of "Jewish Year Book" and "Literary Year Book"; president of the Jewish Historical Society; and an authority in England on fairy tales, of which he published a great many collections. He wrote "English Fairy Tales" (1890); "Studies in Jewish Statistics" (1890); "Celtic Fairy Tales" (1891); "More Celtic Fairy Tales" (1894); "Jewish Ideals" (1896); "English Style and Composition" (1899); and many other works.

Jacobsen, Jens Peter (ya'kub-sen), a Danish novelist; born in Thisted, Jutland, April 7, 1847. He was a botanist and Darwinian who turned to story writing and became eminent as a realistic novelist. "Mogens," "Niels Lyhne," and "Marie Grubbe" are tales of great merit in plot, construction, and style. He died at Copenhagen, April 30, 1885.

Jacob's Ladder (*Polemonium cæruleum*), a herbaceous perennial plant of the natural order *Polemoniaceæ*, a doubtful native of Great Britain, but more common in Central and Southern Europe, and found also in the temperate parts of Asia and of North America. It is common in flower gardens in Great Britain. It has pinnate leaves, with ovato-lanceolate leaflets, a smooth stem 1½ to 2 feet high, and a terminal panicle of bright blue (sometimes white) flowers, with wheel-shaped five-lobed corolla. Great medicinal virtues were once ascribed to it, but the only quality which it seems to possess is a slight astringency.

Jacobson, John Christian, an American clergyman; born in Denmark in 1795. He came to the United States in 1816, was a successful Moravian pioneer; and was consecrated bishop in 1854. He died in 1870.

Jacob's Staff, a pilgrim's staff, so designated from the pilgrimages made to the shrine of St. James at Compostella in Spain. Also a staff containing a concealed dagger.

In surveying, an instrument for taking altitudes, having a brass circle divided into four equal parts by two diametric lines. At each extremity is a perpendicular riglet over the lines, with a hole below each slit for discovering objects. The cross is mounted on a staff. Also an instrument used to measure distances and heights. It has a square rod, with a cross or cursor, which has a set screw to keep it in position on the rod when required. The rod is three or four feet in length, and divided into four or five equal parts. The cursor has a square socket and slips on the staff. The instrument is mounted on a tripod when in use, the cursor being in the plane of the horizon when measuring distances, and vertical to it when measuring heights. Also a straight rod shod with iron, and with a socket joint and pintle at the summit for supporting a surveyor's circumferentor.

Jacob's Stone, a stone fabulously said to be that on which Jacob rested his head at Luz, which was used as the coronation stone of the kings of Scotland at Scone, in Perthshire, and was thence transferred by Edward I. to Westminster, where it still remains, inclosed in the coronation chair.

Jacobsz, Lucas. See LUCAS VAN LEYDEN.

Jacobus, an English coin, of which there were two kinds, viz., the old Jacobus, worth 25 shillings, and the new Jacobus, also called Carolus, valued at 23 shillings, struck in the reign of James I. (1603–1625).

Jacopone da Todi (yä-kō-pō'nuh da tō'-dē), an Italian poet and satirist; born in Todi about 1230. He was a prominent lawyer, who lost his wife, became a monk, and got involved in politics. He wrote dialect poems in support of his party; the stinging sarcasm of his rhymes aimed against Pope Boniface VIII. causing them to be particularly remembered. The hymn "Stabat Mater" is attributed to him, though the authorship has been disputed. He died in Collazzone, Dec. 25, 1306.

Jacotot, Jean Joseph (ja-kō-tō'), a French educator; born in Dijon, March 4, 1770. In the course of his checkered career he was successively soldier, deputy director of the Polytechnic School, military secretary, and the holder of various professorial chairs, as of mathematics, Roman law, etc. The fundamental principles upon which his system of education rests are that the mental capacities of all men are equal; the unequal results of education depend almost exclusively upon will; every person is able to educate himself, provided he is

once started in the right way; knowledge should be acquired in the first place through instinctive experience or by the memory. He died in Paris, July 30, 1840.

Jacquard, Joseph Marie (zhäk-ar′), a French inventor; born in Lyons in 1752. His parents were silk weavers and he learned the same trade. After a long period of hardship, during which he shared in some of the campaigns of the French Revolution, he made his name famous by the invention of his new loom, which was publicly exhibited in 1801. He died in 1834.

Jacquard Loom, a loom for weaving figured goods. A chain of perforated cards is made to pass over a drum, and the strings by which the threads of the warp are raised pass over an edge with a wire or leaden weight of small diameter suspended from each. These weights, at each stroke of the loom, are presented to each successive card, and some of them are intercepted by the card, while others pass through the holes therein, the latter thus determining which threads of the warp shall be raised. In this way the figure on the card determines the nature of the figure on the fabric.

Jacqueline (zhäk-lēn′) **of Bavaria** or **of Holland,** daughter and successor (1417) of William VI. of Holland; born in 1401. After a conflict with the Duke of Burgundy, she surrendered to him her territory in 1433, and died in the Castle Teilingen, on the Rhine, in 1436.

Jacquemart, Albert, a French writer; born in Paris, France, in 1808; was a clerk in the ministry of finance; chief of bureau in the custom house department (1865); and prominent in the Universal Exposition of 1867. He wrote "Ancient, Industrial, and Commercial History of Porcelain" (1861–1862); "History of Ceramic Art" (1872). He died in Nice, France, Sept. 28, 1880.

Jacquemont, Victor, a French botanist; born in Paris, Aug. 8, 1801; studied botany under Adrien de Jussieu; visited North America, Haiti, England, and the East Indies twice, penetrating on his last visit the Chinese Tartary, and declining an offer from Runjeet Singh of the vice-royalty of Kashmir. He wrote "Correspondence" (1834), a delightful book of travel; "Journey in India," published by the French government. He died in Bombay, Dec. 7, 1832.

Jacquerie (zhäk-er-ē′), a name popularly given to a revolt of the French peasantry against the nobility, which took place while King John was a prisoner in England in 1356. Jacques Bonhomme was a term of derision applied by the nobles to the peasants, from which the insurrection took its name. It began in the Beauvoisie, under a chief of the name of Caillet, and desolated Picardy, Artois, and Brie, where savage reprisals were executed against the nobility for their oppressions. It was suppressed after some weeks.

Jactitation of Marriage, a false pretense of being married to another — a wrong for which in England the party injured could formerly obtain redress by a suit in the Ecclesiastical Court. The suit is unknown in modern practice, the English law being clear enough to enable parties to ascertain without litigation whether they are married or not. In Scotland, where the law is not so clear, the suit of declarator of putting to silence (*i. e.* putting an end to pretended claims) answers the same purpose as a suit for jactitation. Thus, in the Yelverton case (1861) the lady's action for declarator of marriage was met by a cross-action for declarator of putting to silence.

Jacuhy (zhä-kö-ē′), a river of Brazil, province of Sao Pedro do Rio Grande; length, about 250 miles.

Jacusi (jak-ö′sē), in Japanese mythology, the god of medicine.

Jade, a name applied to about 150 varieties of ornamental stones, but should be properly restricted to the mineral nephrite, so called from the Greek *nephros* because it was supposed by the ancients to have virtue in renal diseases. The name is from the Spanish *ijada,* "the flank" (from the Latin *ilia*), because it was believed to cure pain in the side; and the mineral was brought by the Spaniards from Mexico. True jade is a native silicate of calcium and magnesium, tough, and of various shades of green, yellowish-gray, and greenish-white. It is never crystalline, and it is very hard, but not excessively so, and is remarkable for being less hard when freshly broken than after exposure. The specific gravity varies from 2.91 to 3.06. Jade has been reported in isolated cases in Prussia, Turkey, and Corsica, but important deposits are unknown in Europe. It is principally found in China, Siberia, New Zealand, and in some of the islands of the South Pacific, while its occurrence has also been reported in British Columbia and Alaska.

Jael, a Jewish woman; wife of Heber the Kenite. When Sisera, the general of Jabin, King of Hazor, sought refuge in her tent after the defeat of his army, and had lain down to sleep, she drove a nail through his head and killed him.

Jaen, a city of Spain, capital of the province of the same name; on a tributary of the Guadalquivir; 50 miles N. by W. of Granada. Its old Moorish walls are fast crumbling away. It is the see of a bishop; the cathedral dates from 1532. By the Moors the town was called *Jayyenu-l-harir,* "Jaen of the Silk," on account of its silk

manufactures, for which, however, it is no longer famous. The province (area, 5,184 square miles), part of Andalusia, lies wholly within the basin of the Guadalquivir, and is for the most part mountainous. Conquered by the Moors on their entrance into Spain, Jaen maintained its independence as a Moorish State till 1246, when it fell into the hands of Ferdinand III. of Castile.

Jaffa, or **Joppa,** a town on the sea coast of Syria, 33 miles N. W. of Jerusalem. Hence Jonah sailed for Tarshish; here Peter had his vision. Under Constantine the place, which had been destroyed by Vespasian, became a bishop's see, and as the great landing place of the Crusaders was taken and retaken by Christian and Moslem. In 1799 Napoleon stormed it and massacred his prisoners; in 1832 it was taken by Mehemet Ali, and restored to the Turks by British help. Pop. (1904) est. 42,500.

Jaffnapatam, a seaport in the extreme N. of Ceylon, on an island of the same name; has been peopled by Tamils for more than 2,000 years. Pop. (1900) 45,000. A large sprinkling of the European population is of Dutch descent.

Jaga Baba (yä'gä-bä'bä), the Bellona or war goddess of the Slavs.

Jagellons (yag'el-lons), a Polish dynasty, founded by Jagellon, or Jagiello, Grand Duke of Lithuania, who married Hedwig, daughter of Louis of Hungary, in 1385, and succeeded to the throne of Poland as Ladislaus V. The house became extinct on the death of Sigismund II. in 1572.

Jagemann, Karoline (yä'gä-man), a German singer; born in Weimar, Jan. 5, 1778. Her first appearance was at Mannheim in 1795 and she created such enthusiasm the following year in her native city that both Goethe and Schiller became her friends and patrons. In 1801 she gained great popularity at Berlin, and later became the mistress of the grand duke. She died in Dresden, July 10, 1848.

Jager, a name for the predatory gulls of the genus *Lestris.*

Jäger, Oskar (yā'ger), a German historian; born in Stuttgart, Oct. 26, 1830. As an educator he attained prestige and official position; while his "History of Recent Times, from the Congress of Vienna to Our Own Day" (1874–1875) is an acknowledged masterpiece. "The Humanist Gymnasium" (1889) is an example of his achievements in pedagogics; and he also wrote "The Punic Wars" (1869–1870) and "John Wyclif and His Significance for the Reformation" (1854), both profound studies.

Jagersfontein Excelsior, The, the largest known diamond in existence; found in the mine of the Jagersfontein Company, Orange River Colony, South Africa, June 2, 1893; now in London, England; weight, 971 carats; color, blue white. It is almost perfect.

Jaggar, Thomas Augustus, an American clergyman; born in New York city, June 2, 1839; was graduated at the General Theological Seminary; ordained deacon in the Protestant Episcopal Church in 1860; was rector of several churches including Anthon Memorial Church, New York, and Holy Trinity, Philadelphia; consecrated Bishop of Southern Ohio in May, 1875; bishop in charge of American churches in Europe from 1908; author of a "Memorial Sermon on Bishop Phillips Brooks" (1893), etc.

Jaggery, a coarse brown sugar made in the East Indies by the evaporation of the juice of several species of palms. It is chemically the same as cane sugar.

Jaghire (jag'hēr), in Hindustan, a term closely corresponding to the fief of mediæval Europe. It is an assignment of the government share of the produce of a portion of land to an individual, either personal or for the support of a public establishment.

Jagst, or **Jaxt** (yaxt), a river in Würtemburg which unites with the Neckar, 6 miles N. of Heilbronn. It is over 160 miles in length. Also a portion of Northeastern Würtemberg, with an area of 1,983 square miles. Pop. (1900) 400,126.

Jaguar, a ferocious looking feline animal, a little larger than a leopard, which it resembles in color, except that in the jaguar the spots are arranged in larger and more definite groups. It is found in the S. part of the United States, through Mexico, Central America, and Brazil, as far S. as Paraguay. It can climb trees and swim rivers. In some places its chief food is the capybara, but it will attack horses, cattle, and even man.

Jahde, or **Jade** (yä'dä), a bay in the N. of Oldenburg, belonging to Prussia, which has a naval station on its shores.

Jahn, Friedrich Ludwig (yän), a German educator; born in Brandenburg in 1778. After graduating with distinction at the universities, he, in 1809, went to Berlin, where he became teacher at the Kölnisches Gymnasium and published his "German Popularity." He then set about the establishment of gymnasia throughout the "Fatherland," whence is derived the "Turnkunst," or system of physical education so well known and appreciated in the United States. He died in 1852.

Jahn, Otto, a German archæologist and philologist; born in Kiel, June 16, 1813. He studied at Kiel, Leipsic, and Berlin. He next traveled in France and Italy, making

a lengthened stay in Rome, and returned in 1839 to lecture at Kiel, whence he was called to Greifswald. In 1847 he accepted the chair of archæology at Leipsic, and here he founded an archæological society, and served as director of an archæological museum. Deprived in 1851 for his part in the political movements of 1848–1849, he became, in 1855, Professor of the Science of Antiquity, and director of the Academic Art Museum at Bonn, whence he was summoned in 1867 to fill Gerhard's chair at Berlin. Jahn's contributions to archæology were numberless and of the first importance. He died in Göttingen, Sept. 9, 1869.

Jain Architecture, the architecture of the Jains. Their chief seats in India being Guzerat and Mysore, the chief temples and ruins exist in those provinces; the oldest are believed to be about Junaghar in Guzerat. There are fine ones on Mount Abu, a granitic mountain 5,000 or 6,000 feet high, in the same province. One temple there is of date between A. D. 1197 and 1247, another about 1032. In Jain architecture there is generally a horizontal dome supported by eight leading pillars, with other less important ones, the whole number in some cases amounting to 56. There are cells as in Buddhist monasteries; they are occupied, however, not by monks, but by the cross-legged images of the Tirthankars, to whom it is dedicated. There is elaborate ornamentation; the temples are surrounded by porticos. Some Jain temples have been converted into mosques.

Jains, or **Jainas** (jāns), the name of a religious sect among the Hindus. They are very numerous in the Southern and Western provinces of Hindustan, and are principally engaged in commerce. It is believed that Jainism is of much later origin than Buddhism or Brahmanism, and that it did not rise into importance till the 8th and 9th centuries of our era. It seems to partake of both of these earlier worships, and was probably an attempt to reconcile Buddhism with Brahmaism. The principal points of difference between them and the Brahmanical Hindus are: (1) A denial of the divine origin of Vedas; (2) the worship of certain holy mortals, who, by living exemplary lives here and by self-mortification, had raised themselves superior to the gods; and (3) extreme tenderness for animal life; in all of which points they resemble the Buddhists. Their moral code, or "great duties," are: (1) Refraining from injury to life; (2) truth; (3) honesty; (4) chastity; (5) freedom from worldly desires. Their four "merits" are — liberality, gentleness, piety, and penances. They number about 1,500,000, and are found throughout Hindustan.

Jaipur (jī-pör′), a native State of Rajputana, India; area (including feudatories), 15,579 square miles; pop. (1901) 2,658.666; passed under British protection in 1818. Capital, Jaipur, the chief city of Rajputana, an important trade center and noted for its fine buildings; dates from 1728; pop. (1901) 160,167.

Jaisalmir, Jaysalmir (jī-sal-mēr′), or **Jesselmere,** a State in Western Rajputana, India; bounded on the N. by the Punjab, on the E. by Bekanir and Marwar, on the S. by Marwar, on the W. by the Bombay Presidency and the Punjab; area, 16,447 square miles; pop. 110,000. It is mostly a sandy desert, though containing a few oases, and the climate presents great extremes of heat and cold. Main industry, cattle-raising; barley and mullet are also cultivated. Most of the inhabitants are JATS (*q. v*). Capital, Jaisalmir; pop. about 10,000.

Jalandhar. See JULLUNDER.

Jalap (so called from Jalapa, in Mexico, whence it is imported), the name given to the tuberous roots of several plants of the order *Convolvulaceæ,* that of *Ipomœa purga* being the most important. This is a twining herbaceous plant, with cordate-acuminate, sharply auricled leaves, and elegant salver-shaped deep pink flowers, growing naturally on the E. declivities of the Mexican Andes at an elevation of from 5,000 to 8,000 feet. The jalap of commerce consists of irregular ovoid dark-brown roots, varying from the size of an egg to that of a hazel nut, but occasionally as large as a man's fist. The drug jalap is one of the most common purgatives, but is apt to gripe and nauseate. It has little smell or taste, but produces a slight degree of pungency in the mouth.

Jalapa (HÄ-lä′pä), capital of the Mexican State of Vera Cruz; 60 miles N. W. of Vera Cruz city; in a charming and fertile district, in a healthy and temperate climate, 4,330 feet above the sea; is neatly built and surrounded with pleasant gardens. The principal buildings are the old Franciscan monastery (1556), the church of St. Joseph, a hospital, and the government offices. Pop. (1904) about 17,000.

Jalapa, a department of Guatemala; area, 1,150 square miles; pop. about 35,000. The surface is broken into mountains and valleys. Agriculture is the leading industry, the chief products being maize and beans. The capital, Jalapa, has a considerable local trade; pop. about 4,500.

Jalaun (jä-loun′), a district in the Jhansi division, New United Provinces, British India; area, 1,469 square miles; pop. about 420,000. Also a town in this district; pop. about 10,000.

Jalisco (Hä-lēs′kō), a state of Mexico, on the Pacific, with an area of 38,840 square miles. It is traversed by the Sierra Madre and in great part forms a plateau. The climate is healthy away from the coast. The principal river is the Rio Grande de Santiago; in the S. E. is the lake of Chapala. Silver and copper mining and agriculture have been the chief industries; but within recent years a number of cotton, woolen, paper, and tobacco factories have been established. Pop. (1900) 1,153,891. The capital is Guadalajara.

Jamaica, a former town and county-seat of Queen's co., N. Y.; since Jan. 1, 1898, a portion of the borough of Queens in Greater New York; on the Long Island railroad, 10 miles E. of the former city of Brooklyn. The town was settled in 1656, and contains many houses dating from before the Revolutionary War, some of which are occupied by direct descendants of the original Dutch settlers. This portion of the borough has large market garden interests, and several carriage factories.

Jamaica, one of the West India Islands, 80 or 90 miles S. of Cuba, the third in extent and the most valuable of those belonging to Great Britain; 146 miles in length E. to W., and 49 miles broad at the widest part; area, 4,200 square miles; pop. (1908) est. 835,800. It is divided politically into three counties — Cornwall, Middlesex, and Surrey; its capital is Kingston; pop. (1898) est. 48,500. The island as a whole is very beautiful, and much of it is fertile. The coast is indented with a number of good harbors, of which Port Royal or the harbor of Kingston is the most considerable. The interior is traversed by lofty mountains in all directions; the principal chain, called the Blue Mountains, reaching the height of 7,270 feet. The declivities are steep, and covered with stately forests. Jamaica is well watered, having numerous rivers and springs. Earthquakes of a violent character have been frequent. The climate in the districts along the coast is, in most places, exceedingly hot, but is not on the whole unhealthy; on the high lands the air is temperate and pure, while even on the low grounds the heat is greatly moderated by the cool sea breezes which set in every morning. There are two rainy and two dry seasons. Among the indigenous forest trees are mahogany, lignum vitæ, ironwood, logwood, braziletto, etc. The native fruits are numerous, and many of them delicious; they include the plantain, guava, custard apple, pineapple, sour sop, sweet sop, papaw, cashew apple, etc. The orange, lime, lemon, mango, grape, bread fruit tree, and cinnamon tree have all been naturalized in the island. The chief cultivated vegetable products are sugar, coffee, maize, pimento, bananas, and other fruits, ginger, arrow root. Sweet potatoes, plantains, and bananas form the chief food of the blacks. The cinchona tree has been introduced, and is spreading. Of wild animals only the agouti and monkey are numerous. Domestic fowls thrive well, and cattle-raising has become profitable. Fish abound in the sea and rivers.

The exports and imports have each an average value of over $8,000,000, sugar, rum, coffee, dyewoods, fruit, and pimento being the chief of the former, and clothing and other manufactured goods of the latter. The government is vested in the governor, assisted by a privy council, and a legislative council composed of 29 members, 14 elected, the others nominated or *ex officio*. The revenue amounts to about $3,000,000 annually; the public debt is about $8,000,000, the greater part of it having been expended on railways, roads, harbors, and other public works. Spanish Town and Kingston are united by railway, and the total number of miles open for traffic is about 70. The English Church is presided over by a bishop, assisted by a regular staff of parochial clergy. The Baptists, Methodists, Presbyterians, and other Protestant bodies are well represented, and there is a considerable number of Roman Catholics and Jews. Education is rapidly extending; but the general state of morality seems to be low, judging from the fact that the illegitimate births are between 50 and 60 per cent.

Jamaica was discovered by Columbus in 1494, in his second expedition to the New World. In half a century the cruelty of the Spanish conquerors exterminated the natives. It was taken by Cromwell in 1655, and ceded to England by the treaty of Madrid in 1670. Of late many Chinese and coolies have been employed in agriculture. In 1865 a serious revolt broke out among the blacks at Morant Bay, and was put down with considerable severity by Governor Eyre. Politically dependent on Jamaica are the Cayman Islands, and the Turks and Caicos Islands.

The Secretary of the Colonies of Great Britain in 1899 directed that in pursuance of official recommendations an income tax, increased stamp duties, and an increased land-tax should be imposed, in order to raise the necessary increase of revenue. He also directed the governor to appoint a full number of nominated members of the Legislature and keep them appointed. He further stated that the Colonial Office would in future exercise control over the finances of the colony. There was much local opposition in consequence, and one

element in the population suggested application to the United States for annexation. In 1907 an earthquake caused great destruction in Jamaica, especially at Kingston.

Jambudvipa (jam-bö-dwē'pä), in Sanskrit poetry and Buddhist writings, a name given to India, though strictly it is applicable to the whole earth, of which India was regarded as the principal part.

James, a name of two, if not three, persons mentioned in the New Testament. (1) JAMES, the son of Zebedee, and brother of the Evangelist John. Their occupation was that of fishermen, probably at Bethsaida, in partnership with Simon Peter (Luke v: 10). On comparing the account given in Matt. iv: 21, Mark i: 19, with that in John i., it would appear that James and John had been acquainted with our Lord, and had received Him as the Messiah some time before He called upon them to attend upon Him statedly — a call with which they immediately complied. Their mother's name was Salome. We find James, John, and Peter associated on several interesting occasions in the Saviour's life. They alone were present at the Transfiguration (Matt. xvii: 1; Mark ix: 2; Luke ix: 20); at the restoration of life of Jairus's daughter (Mark v: 42; Luke viii: 51); and in the garden of Gethsemane during the Agony (Mark xiv: 33; Matt. xxvi: 37; Luke xvi: 37). With Andrew they listened in private to our Lord's discourse on the fall of Jerusalem (Mark xiii: 3). James and his brother appear to have indulged in false notions of the kingdom of the Messiah, and were led by ambitious views to join in the request made to Jesus by their mother (Matt. xx: 20–23; Mark x: 35). From Luke ix: 52, we may infer that their temperament was warm and impetuous. On account, probably, of their boldness and energy in discharging their apostleship, they received from their Lord the appellation of Boanerges, or "Sons of Thunder." James was the first martyr among the apostles. Clement of Alexandria, in a fragment preserved by Eusebius, reports that the officer who conducted James to the tribunal was so influenced by the bold declaration of his faith as to embrace the Gospel, and avow himself also a Christian; in consequence of which he was beheaded at the same time. He is the patron saint of Spain, there being a groundless legend of his having planted the Gospel in that country. (2) JAMES, the son of Alphæus, one of the 12 apostles (Mark iii : 18; Matt. x : 3; Luke vi: 15; Acts i: 13). His mother's name was Mary (Matt. xxvii: 56; Mark xv: 40); in the latter passage he is called James the Less, either as being younger than James the son of Zebedee, or on account of his low stature (Mark xvi: 1; Luke xxiv: 10). (3) JAMES, "the brother of the Lord" (Gal. i: 18). Whether this James is identical with the son of Alphæus is a question which Dr. Neander pronounces to be the most difficult in the apostolic history, and which cannot be considered as decided. It is probable, however, that he was a different person.

Epistle of St. James.— The first of the general epistles. The apostle James, the son of Zebedee, died too early to have been its author. It was penned by either James, the son of Alphæus, or James the brother of our Lord, if the two were different; by the apostle who bore both designations if they were the same. It was addressed to the 12 tribes scattered abroad, *i. e.*, to the Jewish converts to Christianity beyond the limits of Palestine. Its teaching is in disconnected portions, and treats more of conduct than of belief, though the indispensableness of faith to efficacious prayer is strongly insisted on (i: 6). Portions of it look antagonistic to the teaching of St. Paul (see Rom. iii: 28 with James ii: 21, 25), and most rationalists believe that the antagonism is real. But faith is used in a different sense in James from that which it obtains in the Pauline writings. What Paul calls simply "faith," James would term a living faith, and it is not against it but against a dead faith that he contends (ii: 17). The epistle was written probably at Jerusalem. Its date is uncertain. It has been fixed in A. D. 44 or 45, in A. D. 60, in A. D. 62, and not till the 2d century. Clement of Rome seems to have referred to it, and perhaps Hermas. Origen expressly mentions it as the epistle ascribed to St. James. It figures in the Syrian Version of the New Testament. It was ranked by Eusebius among his Antilogoumena. In A. D. 397 the Council of Carthage placed it in the canon. Though Luther spoke disrespectfully of it, yet it is now generally accepted as a portion of Divine Scripture.

James I., King of Scotland, of the house of Stuart; born in Dunfermline in 1394; the son of Robert III. by Annabella Drummond. In 1406 he sailed for France in accordance with the wish of his father, that he might escape the danger to which he was exposed by the ambition of his uncle the Duke of Albany, who had previously rendered his own accession to the throne more easy by the murder of the heir apparent, the Duke of Rothesay; but the vessel in which he was being conveyed was taken by the English off Flamborough Head, and he and two companions were carried prisoners to the Tower of London. For the next 18 years he remained a prisoner in England, being confined during part of his captivity in Nottingham Castle, Evesham,

and Windsor Castle. He received an excellent education from Henry IV. of England, and to relieve the tedium of captivity he applied himself to those poetical and literary pursuits in which he so highly distinguished himself. Robert III. died very shortly after learning of his son's captivity and James was proclaimed king; but during the remainder of the reign of Henry IV. and the whole of that of Henry V. he was ungenerously detained in England, with a view to prevent the alliance of Scotland with France. This did not, however, prevent the apprehended result. James was for some time in France with Henry V. and he witnessed the capitulation of Melun. At length in 1424 under the regency of the Duke of Bedford he was restored to his kingdom, at which time he was in his 30th year. But hostages for the payment of 60,000 marks in installments of 10,000 a year, had to be given before his captivity came to an end. A promise was secured that the Scottish troops would leave France, and it was requested that James should marry an English lady. Previous to his departure he married Jane or Joanna Beaufort, daughter of the Earl of Somerset, a lady of distinguished beauty, of the blood royal of England, who is the fair dame alluded to in his beautiful poem of the "King's Quhair." James had become enamored of her through seeing her in the royal gardens from the windows of his apartments while a captive in Windsor Castle. One year's payment of the ransom was remitted as her dowry.

On his return to Scotland he in 1425 arrested the Duke of Albany, the late regent, and a large number of his relations and supporters, and after a summary trial had them executed as traitors. These and some other rather arbitrary and impolitic measures were atoned for by the enactment of many good laws; and as far as a lawless nobility would allow them to be put in practice these much improved the state of society in Scotland. In 1428 he renewed the Scottish alliance with France, betrothing his daughter Margaret to the dauphin, afterward Louis XI., and in 1436 she was sent to France. A fruitless endeavor of the English to prevent this marriage by intercepting the Scottish fleet so exasperated James that he declared war against England. He was, however, on such bad terms with his nobility in consequence of his endeavors to curb their ambition and improve his revenue, that after besieging Roxburgh Castle he was obliged to disband his army under the apprehension of a conspiracy. He then retired to the Carthusian monastery of Perth, which he had himself founded, where he lived in a state of privacy which facilitated the success of a plot formed against his life. The chief actors in this tragedy were Robert Graham, uncle of the Earl of Strathearn, and Walter, Earl of Athol, the king's uncle, the former of whom was actuated by revenge for the resumption of some lands improperly granted to his family, and the latter by hopes of succeeding to the crown. By means of bribery the assassins who had under their command 300 armed men gained admission to the king's apartments, and an alarm being raised, the queen's ladies attempted to secure the chamber door. One of them, Catharine Douglas, thrust her arm through the staple in which state she remained till it was broken by the assailants. The instant the assassins got into the apartment they dragged the king from his concealment in a recess under the floor, and in spite of the cries and remonstrances of the queen, who in vain threw herself between them and the object of their resentment, put him to death by multiplied wounds. He perished in the 44th year of his age and 13th of his reign, Feb. 21, 1437, leaving one son and five daughters; and his murder was punished by the deaths of the conspirators in exquisite tortures. The king who may be said to have fallen a martyr to his attempts to abolish the anarchy and disorder which prevailed throughout his kingdom, holds a deservedly high place in the catalogue of royal authors by his poem of the "King's Quhair" (that is, book). Among the works ascribed to James I. are three admirable descriptive poems respectively entitled, "Christ's Kirk on the Green," "Peblis to the Play," and the "Gaberlunzie Man," the authorship of which is sometimes given to James I. and sometimes to James V.

James II., King of Scotland; born in 1431, when his father was assassinated was only 7 years of age. A minority under such circumstances could not but be troubled and the kingdom was distracted by contending factions, who strove for the possession of the king's person, as the surest means of obtaining the ascendency. The chancellor, Crichton, and Sir Alexander Livingston wielded conjointly the royal authority till James had reached his 14th year. To curb the power of the great house of Douglas, which rivaled that of the crown, Crichton had caused Earl William and his brother to be put to death. A politic marriage, however, not only conserved but enhanced the power of the Douglases, and allying himself with the chief of that house James held a Parliament, which declared Crichton and Livingston rebels and forfeited their estates. In 1449 he married Mary of Guelderland and his character at once became more mature and decided. He resolved to free himself from the galling and overmastering influence of Douglas, who was virtually the supreme authority in the kingdom. Inviting him to a conference at Stirling Castle in 1452, on a quarrel having

arisen James murdered him with his own hand. His heir to avenge this perfidy, aided by the house of York, raised the standard of rebellion at the head of an army of 40,000, but he was compelled to flee and his lands were confiscated. In 1460 James, while besieging the Castle of Roxburgh, in direct violation of an existing truce with England, was killed by the bursting of a cannon in the 29th year of his age.

James III., King of Scotland, born in 1453, was, like his father James II., whom he succeeded in 1460, a mere boy when he mounted the throne and of course remained for many years in the hands of guardians, who disregarded his interests and used their power for factious purposes. On the death of Bishop Kennedy in 1465 James fell into the hands of the Boyd family, who in a short period acquired so great influence that the king gave Sir Thomas Boyd his sister in marriage. In 1469 James married Margaret of Denmark and in the same year the Boyds were deprived of power. His attachment to worthless favorites was the principal weakness of James. Cochrane, originally a mason, or more probably an architect, was the most conspicuous of these and through his means one brother of James was compelled to flee the kingdom while another was put to death. The nobility, impatient of the overweening and dangerous influence of what they deemed upstarts, seized on Cochrane and five others of the principal favorites and hanged them at Lauderbridge in 1482, while the Scottish army was marching to meet an invading force of the English under Gloucester. The army was disbanded and the king himself shut up in Edinburgh Castle. In 1487 the queen died. Not long after a conspiracy of a large portion of the nobles was formed to dethrone the king, whose peaceful and unambitious character was contemptible in the eyes of his turbulent and warlike subjects. Those peers who remained loyal gathered round the king and parties having levied their forces the decisive encounter took place at Sauchie, near Sterling, on June 18, 1488, when the king, completely defeated, fled for his life, but falling from his horse was dragged into a cottage and barbarously murdered. His body, concealed by the murderers, was never found.

James IV., King of Scotland, born March 17, 1472, was son of James III. by Margaret, daughter of the King of Denmark, and was thus in his 16th year when in consequence of his father's murder, above narrated, he succeeded to the throne. During the rebellion he had been confided to the charge of Shaw of Sauchie, governor of Stirling Castle, who proved a traitor and delivered him to the rebels. They to strengthen their cause immediately recognized him as their king, and he was thus nominally if not voluntarily at war with his father, and in league with those who murdered him. What his real intentions were is not clear, but it is difficult to believe that if he had not been conscious of guilt, he would have expressed so much contrition, and even endeavored, according to the superstition of the times, to avert the vengeance of heaven for unfilial conduct by wearing an iron belt or chain around his waist and adding to its weight every year by way of penance. But for the suspicion which thus attached to him and some domestic infidelities James would be worthy of admiration both as a man and as a prince. He was personally handsome, brave, and generous, excelled in all manly exercises, loved his letters, though his education was scanty in the extreme; raised the Scottish court to a high degree of refinement and magnificence, administered justice with great impartiality and passed many excellent laws.

In the beginning of his reign the naval exploits of Sir Andrew Wood of Largo attracted an attention which was not confined to Britain. For various reasons therefore James was rewarded with a popularity greater than any previous King of Scotland had enjoyed and still holds an important place in its ballads and other traditional literature. The interest which thus attaches to his memory was undoubtedly heightened by the disaster which terminated his life. In 1503 he had married Margaret, daughter of Henry VII., King of England, and thus for a time put an end to the unnatural hostility between the two countries.

Unfortunately, however, on the accession of Henry VIII. to the English crown in 1509, the relation between the two courts became less friendly, and at length strained relations were followed by open war in 1513. The causes of quarrel were various and none of them were of great importance. One of the chief was Henry's refusal to give up to the queen a legacy of jewels bequeathed her by her father. The French ambassador brought provisions and money to Scotland and also a letter from Anne of Brittany appealing to James as her knight to assist France, and though the war was generally disapproved by the Scots, such was the king's popularity that his summons for an array of the whole kingdom was speedily answered and he set out for the South at the head of an army of 60,000 men. He crossed the border, took several castles, and had occupied a strong position, when the Earl of Surrey, with an army about equal to his own, but better trained, advanced to oppose him. The battle fought on Sept. 9, 1513, and only too well known as that of Flodden Field, terminated after a sanguinary conflict of three hours in the total defeat with heavy loss of the Scots. James and a large portion

of his nobility were among the slain. He died in the 42d year of his age and 26th of his reign.

James V., King of Scotland; born in Linlithgow, April 10, 1512; succeeded in 1513, at the death of his father, James IV., though only 18 months old. His mother, Margaret of England, was named regent during his childhood, but the period of his long minority was one of lawlessness and gross misgovernment. The factions of the Duke of Albany who had been appointed regent by the Parliament after Margaret's remarriage, and of the Earl of Angus, who had married the queen mother, had a fierce struggle for supremacy. The victory remained with Angus, and it was with difficulty that the young king could escape from the power of the Douglases, and at the age of 17 assume the reins of government. He now reduced Angus' castle of Tantallon and compelled that noble to flee to England and he then set himself to put down the lawlessness of the Border district. His policy like that of most of the Stuart kings of Scotland was to use the clergy and the commons to curb the great nobles. In 1536 he visited the court of France and on Jan. 1, 1537, he married Madeleine, daughter of Francis I., but the queen died two years after. He afterward married Mary of Lorraine, daughter of the Duke of Guise and widow of Louis of Orleans. His uncle, Henry VIII., having broken with Rome, was anxious to draw his nephew along with him but without success. He proposed that they should have an interview at York and remained in that city for six days but James never came. A rupture between the two kingdoms was the result of this studied neglect and the Duke of Norfolk entered Scotland with an army of 20,000 men, ravaged the country and retired. The Scottish nobles refused to follow the king who was bent on the invasion of England. This disappointment and the shameful rout of 10,000 Scots at Solway Moss, which followed immediately thereafter, attributed to his injudicious favoritism for a certain Oliver Sinclair, whose appointment to the command of the expedition had been resented by the leaders, filled the king with the deepest gloom. Almost simultaneously came news of the birth of a daughter, the ill-fated Mary Queen of Scots. He died on Dec. 16, 1542, seven days after the birth of his unfortunate daughter. To him Scotland owes the foundation of the College of Justice, which developed into the Court of Sessions.

James I. of England and VI. of Scotland; born in Edinburgh Castle, June 19, 1566; was the only child of Mary Queen of Scots, by her cousin Henry Stuart, Lord Darnley. In the following year, Mary being forced to resign the crown, he was solemnly crowned at Stirling and from that time all

public acts ran in his name. In the stormy times which followed the infant prince was committed to the charge of the Earl and Countess of Mar. His childhood was passed in civil wars under the regencies of Murray, Mar, and Morton, during which time he resided in Stirling castle, under the tuition of the celebrated Buchanan. From the first he seems to have imbibed those exalted

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notions of the royal authority and divine right which proved so injurious to his posterity, but he was naturally cautious and fond of peace. Eager to have the king in their hands, a party of his nobles in 1582 took possession of his person at Ruthven Castle (the Raid of Ruthven). A new confederacy, however, effected his liberation and he again put himself under the direction of his favorite, the Earl of Arran. The policy of Queen Elizabeth, whose apprehensions from the Catholic party in favor of Mary led her to employ every art to keep up a dissatisfied party in Scotland, was greatly assisted by the violent and unprincipled measures of Arran against the connections of the late conspirators, many of whom fled to England, while Gowrie was executed. But James had soon to throw over Arran, and found it advisable to ally himself with Queen Elizabeth and accept a pension from her.

When, however, it became apparent that the life of his mother was in danger from the sentence of an English judicature James sent representatives to England to intercede with Elizabeth, but his whole procedure in the matter shows a singular callousness. As a matter of form he ordered the clergy to pray for his mother but had considerable difficulty in getting anyone to do so. When

the news of Mary's execution arrived James was not much moved, but he attempted to make a show of indignation by condemning one of the commissioners to death, a sentence which, however, he commuted to banishment. On Nov. 23, 1589, James married Anne, daughter of Frederick II., King of Denmark. On his return home, after passing the winter in festivities at Copenhagen, he was in some danger from the unruliness of the nobles, and for several succeeding years of his reign the history of Scotland displays much turbulence and party contest. In 1600 while the country was in a state of unusual tranquillity there occurred what is known as the Gowrie conspiracy.

In 1603 James having succeeded to the crown of England on the death of Queen Elizabeth proceeded amid the acclamations of his new subjects to London. One of his first acts was to bestow a profusion of honors and titles on the inhabitants of both countries, in which as in many other points, he displayed a contrast to the maxims of the late reign. At a conference held at Hampton Court between the divines of the Established Church and the Puritans James exhibited the ill will he bore to popular schemes of Church government. The meeting of Parliament also enabled him to assert those principles of absolute power in the crown which he could never practically maintain, but the theoretical claim of which provided the increasing spirit of freedom in the House of Commons with constant matter of alarm and contention. Though James had behaved with great lenity to the Catholics in Scotland those in England were so disappointed in their expectations of favor that the famous gunpowder plot was concerted in 1605, the object of which was to blow up the king and both houses of Parliament. (See GUNPOWDER PLOT.)

His cares for reducing and improving Ireland do him honor. In 1612 he lost his eldest son Henry, a prince of great promise, then of the age of 19, and in the following year the eventful marriage of his daughter Elizabeth with the elector palatine took place. No circumstance in the reign of James was more unpopular than his treatment of the celebrated Sir Walter Raleigh. James had set his heart on marrying his son Charles to a Spanish princess, but the negotiations failed through the overbearing temper of Buckingham, the royal favorite, who quarreled with the grandees of the Spanish court. The close of the life of James was marked by violent contests with his Parliament. He was also much disquieted by the misfortune of his son-in-law, the elector palatine, who having been induced to accept the crown of Bohemia and to head the Protestant interest in Germany, was stripped of all his dominions by the emperor. Urged by national feelings for the Protestant cause he was at length, March 10, 1624, induced to declare war against Spain and the emperor and troops were sent over to Holland to act in conjunction with Prince Maurice. It is thought that the defeat of this enterprise produced in the king so much uneasiness as to cause the intermittent fever by which he was soon after attacked and of which he died March 27, 1625.

James II. of England, second son of Charles I. and of Henrietta of France; born Oct. 15, 1633, and immediately declared Duke of York, though only formally raised to that dignity in 1643. After the capture of Oxford by the Parliamentary army he escaped in 1648, at the age of 15, and was conducted to his sister, the Princess of Orange. He soon after joined his mother in Paris, and when he had reached his 20th year served in the French army under Turenne and in 1656 entered the Spanish army in Flanders under Don John of Austria and the Prince of Condé. At the Restoration in 1660 he took the command of the fleet as lord high admiral and was also made Warden of the Cinque Ports. He had previously married Anne, daughter of Chancellor Hyde, afterward Lord Clarendon. (See CLARENDON). In 1671 the Duchess of York died leaving her husband two daughters who became successively queens of England. Before her death she declared

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herself a convert to the Roman Catholic faith, which had been secretly that of the duke for many years and was now openly avowed by him. This declaration produced a great impression on the people and laid the foundation of the opposition which finally drove him from the throne. A test act being soon after passed to prevent Roman Catholics from holding public employments the duke was obliged to resign his command.

On Nov. 21, 1671, James married Mary Beatrice of Este, daughter of the Duke of

Modena, and in 1677 his eldest daughter Mary was united to William, Prince of Orange. During the violent proceedings on account of the supposed popish plot in 1679, by the advice of the king he retired to Brussels, and a bill passed the Commons for his exclusion from the throne, which was, however, rejected by the Lords. When the royal party again prevailed the duke in 1681 was sent into Scotland, where he countenanced acts of rigor, not to say cruelty, to the enthusiasts for the Covenant. During the whole of the remaining reign of Charles II., indeed, during which he possessed great influence in the government, he was forward in promoting all the severe measures that disgraced it.

On the death of Charles II., Feb. 6, 1685, the duke succeeded, under the title of James II., and from the time of his ascending the throne seems to have acted with a steady determination to render himself absolute and to restore the Roman Catholic religion. After disgusting the great majority of his subjects by attending mass with all the ensigns of his dignity he proceeded to levy the customs and excise without the authority of Parliament. At variance with his Parliament he was under the necessity of accepting a pension from Louis XIV. He sent an agent to Rome to pave the way for a solemn readmission of England into the bosom of that Church, and received advice on the score of moderation from the Pope himself. This conduct encouraged the rebellion of the Duke of Monmouth. The unrelenting temper of James was again exhibited in the executions on this account. The legal proceedings under Jeffreys were brutal in the extreme, and no fewer than 320 persons were hanged on the Western circuit alone, which attained an unenviable notoriety as the "Bloody Assize." The temporary awe produced by this severity, even in Parliament, was so great that James was encouraged to throw off almost all disguise both in regard to religion and government.

By virtue of the dispensing power which he assumed he rendered tests of no avail, and filled his army and council with Roman Catholics. He put Ireland entirely into their hands and governed Scotland by a few noblemen who had become converts to the same faith. He gradually proceeded to a direct attack on the Established Church, by the formation of an ecclesiastical commission, which cited before it all clergymen who had done anything to displease the court. To conciliate the Puritans a declaration of indulgence in matters of religion was ordered to be read by the clergy in all the churches of the kingdom. Its real object however was to favor the Roman Catholics. Seven bishops met and drew up a loyal and humble petition against this ordinance, and for this act they were sent to the Tower on a charge of seditious libel. On June 29, 1688, they were acquitted amid the most enthusiastic rejoicings of the populace and the government and person of James were regarded with even increased dislike.

The innovations in regard both to the religion and government gradually united opposing interests and a large body of nobility and gentry concurred in an application to the Prince of Orange, signed by seven of the most prominent and influential political leaders, to come over and occupy the throne. James, who was long kept in ignorance of these transactions, when informed of them by his minister at The Hague, was struck with terror equal to his former infatuation, and immediately repealing all his obnoxious acts he practised every method to gain popularity. All confidence was, however, destroyed between the king and the people. William arrived with his fleet in Torbay Nov. 5, 1688, and landed his forces, amounting to 14,000 men. The remembrance of Monmouth's rebellion for some time prevented the people in the W. from joining him; but at length several men of rank went over, and the royal army began to desert by entire regiments. Incapable of any vigorous resolution and finding his overtures of accommodation disregarded, James resolved to quit the country. He repaired to St. Germain, where he was received with great kindness and hospitality by Louis XIV. In the meantime the throne of Great Britain was declared abdicated and was occupied, with the national and parliamentary consent, by his eldest daughter, Mary, and her husband, William, conjointly; Anne who had equally with her sister been educated a strict Protestant, being declared next in succession, to the exclusion of her infant brother, known in history as the Pretender, who had been born on June 10 of that year. Assisted by Louis XIV. James was enabled in March, 1689, to make an attempt for the recovery of Ireland. The battle of the Boyne, fought July 1, 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive and he spent the last years of his life in acts of ascetic devotion. He is even said to have entered into the Society of Jesus. He died in St. Germain Sept. 16, 1701.

James, Francis Edward Stuart; born in 1688, known as CHEVALIER DE ST. GEORGE, or the OLD PRETENDER, was the son of James II., by his second wife, Mary d'Este. In 1708 he sailed from Dunkirk with a French fleet for the invasion of Scotland, but the vigilance of the English admiral, Sir George Byng, prevented the execution of the plan, and the prince returned to France. In 1715 a rebellion in his favor, headed by the Earl of Mar, broke out in Scotland. In December, the Pretender him-

self arrived at Peterhead, assumed royal state, formed a council, and made a progress through the country, but the case was hopeless, and he was glad to escape to Gravelines. In 1719 the prince married Maria Clementina, daughter of the King of Poland, by whom he had two sons, Charles Edward, the Young Pretender, and Henry, Cardinal of York. Maria Clementina died in 1735. Disaffection and restlessness continued in Great Britain and showed themselves from time to time in overt acts, and, in 1745 another Jacobite rebellion broke out in Scotland, Prince Charles Edward landing there, and getting his father proclaimed once more. This struggle ended with the defeat of the Jacobites at Culloden by the Duke of Cumberland, 1746. The Pretender died in Rome, where he had lived for many years, in 1765.

James, George Payne Rainsford, an English novelist; born in London, England, in 1801. While still very young he manifested a considerable turn for literary composition, and produced, in 1822, a "Life of Edward the Black Prince." Some years afterward he composed his first novel, "Richelieu," which was shown in manuscript to Sir Walter Scott, and published in 1829. Its success determined him toward fiction, and a series of novels, above 60 in number, followed from his pen in rapid succession, besides several historical and other works. Among them may be mentioned "Darnley"; "De L'Orme"; "Philip Augustus"; "Henry Masterton"; "Mary of Burgundy"; "The Gipsy"; "History of Chivalry"; "Life of Charlemagne." Latterly he accepted the office of British consul, first at Richmond, Va., and afterward at Venice, where he died in 1860.

James, George Wharton, an American ethnologist; born in Gainsborough, England, Sept. 27, 1858; devoted himself to researches in geology, archæology, and ethnology in California, Nevada, and other Western States. He was the author of "The Lick Observatory" (1888); "The Missions and Mission Indians of California"; "In and Around the Grand Canyon" (1900); "Indian Basketry" (1900); etc.

James, Henry, an American scholar; born in Albany, N. Y., June 3, 1811. He resided in Cambridge. Among the most noted of his works on morals and religion are: "What is the State?" (1845); "Moralism and Christianity" (1852); "Lectures and Miscellanies" (1852); "The Nature of Evil" (1855); "Christianity the Logic of Creation" (1857); "Substance and Shadow" (1863); "The Secret of Swedenborg" (1869). He died in Cambridge, Mass., Dec. 18, 1882.

James, Henry, an American writer; son of Henry; born in New York, April 15, 1843. He was educated in France and Switzerland and at Harvard Law School. After 1869 he made his home in England. His works include: "Transatlantic Sketches" (1875; "A Passionate Pilgrim and Other Tales" (1875); "Roderick Hudson" (1876); "The American" (1877); "Watch and Ward" (1878); "French Poets and Novelists" (1878); "Daisy Miller: a Study" (1878); "The Europeans: a Sketch" (1878); "An International Episode" (1879); "The Madonna of the Future and Other Tales" (1879); "Hawthorne" (1879); "A Bundle of Letters" (1880); "Confidence" (1880); "The Diary of a Man of Fifty" (1880); "Washington Square" (1880); "The Portrait of a Lady" (1882); "Daisy Miller: a Comedy" (1883); "The Siege of London; The Pension Beaurepas; and The Point of View" (1883); "Portraits of Places" (1883); "Tales of Three Cities" (1884); "A Little Tour in France" (1885); "The Art of Fiction" (1885), with Walter Besant; "Stories Revived" (2 vols. 1885); "The Author of Beltraffio" (1885); "The Bostonians" (1886); "The Princess Casamassima" (1886); "Partial Portraits" (1888); "The Aspern Papers and Other Stories" (1888); "The Reverberator" (1888); "A London Life" (1889); "The Tragic Muse" (1890); "Port Tarascon" (1891), a translation; "The Lesson of the Master" (1892), a volume of stories; "The Real Thing and Other Tales" (1893); "Picture and Text" (1893); "The Private Life" (1893), a volume of stories; "Essays in London and Elsewhere" (1893); "The Wheel of Time" (1894); "Theatricals" (1894); "Terminations" (1895); "What Maisie Knew" (1897); "In the Cage" (1898); "The Two Logics" (1898); "The Awkward Age" (1899); "The Soft Side (1900); "The Sacred Fount" (1901); etc.

HENRY JAMES.

James, John Angell, an English clergyman; born in Dorsetshire, June 6, 1785. He was highly popular, and when only 20 was settled as pastor of the "church meeting in Carr's Lane," Birmingham, where

he remained till his death, Oct. 1, 1859. In the course of years he came to be considered the most important and influential public man in connection with his own denomination among the Congregationalists, and on account of his evangelical views of religion he was also much esteemed both by the Low Church party in the English Establishment, and by dissenters generally. He published a multitude of sermons, tracts, addresses and small religious volumes (the best known being the "Anxious Inquirer"), which had a vast circulation.

James, Thomas Lemuel, an American banker; born in Utica, N. Y., March 29, 1831; received a common school education; became a printer; published a paper in Hamilton, N. Y., in 1851–1861; was inspector of customs in New York in 1861–1864; deputy collector of customs in 1870–1873; postmaster of New York city in 1873–1881; postmaster-general of the United States in 1881–1882; then became president of the Lincoln National bank in New York city.

James, William, an American educator; born in New York city, Jan. 11, 1842; received a private education; accepted the chair of philosophy at Harvard College in 1872; was Gifford lecturer on Natural Religion at the University of Edinburgh in 1899–1901. He is the author of "Principles of Psychology" (2 vols.); "Psychology: Briefer Course"; "The Will to Believe; and Other Essays in Popular Philosophy"; and "Talks on Psychology and Life's Ideals." He died Aug. 26, 1910.

James Island, one of the islands in the harbor of Charleston, S. C., at the mouth of the Ashley river. The battle of Secessionville (June 16, 1862) and several other engagements of the Civil War were fought here.

Jameson, Anna, an Irish author and critic; born (Murphy) in Dublin in 1794. In 1823 she married Robert Jameson. The union proved very unfortunate, and she ceased to live with him. Mrs. Jameson published in 1831 her first important work, entitled "Memoirs of Female Sovereigns," and this was succeeded in the following year by "Characteristics of Women." But it is as an art critic that Mrs. Jameson is best entitled to remembrance. Her works in this branch of literature exhibited considerable historical research, and were distinguished for their grace of style. Chief among these works were: "Lives of Early Italian Painters" (1845); "Poetry of Sacred and Legendary Art" (1848); "Legends of the Monastic Orders" (1850); "Legends of the Madonna" (1852); and a "Commonplace Book of Thoughts, Memories, and Fancies" (1845). She died in Ealing, March 19, 1860.

Jameson, John Franklin, an American educator; born in Boston, Mass., Sept. 19, 1859; was graduated at Amherst College in 1879; Professor of History at Brown University in 1888-1901; became head professor of the same at the University of Chicago in the latter year. He is the author of "William Usselinx, Founder of the Dutch and Swedish West India Companies" (1887); "History of Historical Writing in America" (1891); "Dictionary of United States History" (1894); etc.

Jameson, Leander Starr, a British administrator; born in Edinburgh in 1853. He was educated at London University. Having become associated with Rhodes in the development of South Africa, he was appointed Administrator of Rhodesia in 1891, and held the position with distinction till the raid on the Transvaal in 1895, when he was defeated at Krugersdorp. He was afterward given up to the imperial authorities, tried and sentenced to 10 months' imprisonment. After seven months, however, he was released, owing to ill health. In 1897 he returned to Rhodesia and assisted in the development of the country; premier of Cape Colony, 1904-1908.

Jameson, Robert, a Scotch naturalist and geologist; born in Leith, July 11, 1772. Intended for a doctor, he early manifested a strong love for the study of animals and plants, and, having studied under Werner at Freiberg (1800–1802), he was elected in 1804 to the chair of Natural History in the university at Edinburgh. In 1808 he founded the Wernerian Society of Edinburgh; and in 1809 brought out his "Elements of Geognosy," in which he gave a comprehensive exposition of the Neptunian theory as modified by Werner. He afterward confessed his conversion to the views of Hutton. His other works are "A System of Mineralogy" (1804); "A Mineralogical Description of Scotland" (1804), which was meant to include all the counties of Scotland, though Dumfriesshire only was finished; "Manual of Minerals and Mountain Rocks" (1821); and "Elements of Mineralogy" (1837). He died in Edinburgh, April 19, 1854.

Jameson, Robert William, a British journalist; born in Leith in 1805. Radical in his politics, he wrote brilliantly during the Anti-Corn-Law agitation; evolving between times, "Nimrod" (1848), a poem in blank verse; "The Curse of Gold" (1854), a novel; and a tragedy, "Timoleon." He died in London, Dec. 10, 1868.

Jamesone, George, a Scotch painter; born in Aberdeen in 1586. He studied under Rubens at Antwerp, where he had Vandyck as a fellow pupil. Returning to his

native country in 1628, he became the most famous portrait painter that Scotland has ever possessed, at least till recent times. He also painted historical pieces and landscapes. His excellence consists in delicacy and softness of shading, and a clear and beautiful coloring. He died in Edinburgh in 1644.

James River, a river in Virginia; formed by the union of the Jackson and Cowpasture rivers, passes through the Blue Ridge, and pursues a devious course as far as Scottsville. At Richmond it falls 100 feet in six miles, thereby affording a grand water power. Above this point the James River and Kanawha canal extends, following the course of the river and embracing extensive reaches of slack water navigation, to Buchanan, 196 miles. The tide comes up to the Rocketts, just below Richmond. This is the head of navigation for steamboats and schooners of 130 tons. Shipping of the first class comes up to City Point, 40 miles below, at the mouth of the Appomattox. Below City Point the river is a broad, deep, tidal estuary, 66 miles long. The James river flows into Chesapeake bay through Hampton Roads. The entire length from Covington, Va., to Old Point Comfort, is some 450 miles.

James' Bay, the S. arm of Hudson Bay, about 250 miles long from N. to S., and 175 miles wide. It is greatly beset with islands, and its navigation is dangerous.

James' Powder, the modern representative of an old nostrum of Dr. Robert James (1703-1776) of London. The preparation in the pharmacopœia, which is supposed to have similar virtues in febrile affections, consists of oxide of antimony and phosphate of lime. Medical opinion is divided as to its efficacy, and it is but little used now.

Jamestown, a city in Chautauqua co., N. Y., at the outlet of Chautauqua Lake, and on the Erie, the Jamestown and Lake Erie, and several other railroads; 69 miles S. W. of Buffalo. It is the trade center for Chautauqua county, and the distributing point for Chautauqua Lake resorts; connected by trolley with Falconer and Lakewood; is largely concerned in the agricultural industry; and has manufactures of cloth, boots and shoes, furniture, axes and other edge tools, pianos, iron fabrics, and brooms.

Two of the city's principal philanthropic institutions are the Gustavus Adolphus Orphan Asylum and the Young Men's Christian Association Hospital; it also possesses a high school, a business college, and the James Prendergast Free Library. It is considered a desirable summer resort, and, because of its nearness to the great Chautauqua institution, attracts many visitors. Jamestown has a national and other banks, and issues weekly and monthly periodicals. Its water works and electric light plant are owned and controlled by the municipality. Pop. (1900) 22,892; (1910) 31,297.

Jamestown, a district of James City co., Va., the first permanent English settlement within the limits of the United States; founded in 1607 on a peninsula 32 miles from the mouth of James river. It has now become an island by the action of the current, which has carried away a portion of the site of the ancient town. Only the ruins of the church, the fort, and of two or three houses mark the spot. Jamestown became the capital of an extensive colony, and in 1619 a house of burgesses, the first legislative assembly ever convened in British America, met here. And, strangely enough, the same year witnessed the introduction of negro slavery, a number of Africans being brought into the town. During Bacon's Rebellion (*q. v.*) in 1676 Jamestown was burnt to the ground as the capital of the detested Gov. William Berkeley (*q. v.*); some years later it was again destroyed by fire and never rose from its ashes. Long in decline, it was abandoned as a capital, and the seat of government was removed in 1698 to Williamsburg. Jamestown was the scene of an engagement between the forces of Wayne and those of Lord Cornwallis in 1781. The old historic ruins were left to the mercy of the encroaching river till a few years ago, when the Association for the Preservation of Virginia Antiquities bought it, and, securing the coöperation of the national government, succeeded in building a sea-wall as a defense against further destruction.

Jamestown Exposition, an exposition held on the historic shores of Hampton Roads, near Norfolk, Va., from April 26 to Nov. 30, 1907, in commemoration of the three-hundredth anniversary of the settlement of Jamestown in 1607 by John Smith (*q. v.*) and his band of pioneers. This exposition was remarkable for military and naval demonstrations, which included warships and representative regiments from every great nation of the world, sent to participate in response to invitation from the United States government, expressed through a proclamation issued by President Roosevelt, March 29, 1905. As an international convocation of fighting men with their modern battleships and engines of war, this feature of the tercentennial exposition was without precedent. Furthermore it signalized the first occasion on which foreign warships and foreign troops assembled in American waters and on American soil to join in the celebration of a distinctly national event. Three miles of waterfront and the magnificent Hampton Roads (*q. v.*) channel afforded an ideal arena for the naval

manœuvers and nautical feats of the various ironclads, submarines, and torpedo boats of the respective powers. Thirty acres, known as "Lee's Parade," were set apart in a central location on the exposition grounds, and allotted to the gigantic military display, while another tract of 200 acres was assigned as camping quarters. The ground area of the entire exposition amounted to about 400 acres. Nearly all of the architecture on the grounds was of Colonial design, and many of the structures, including all the States' buildings, were erected as permanent landmarks. In front of "Lee's Parade" stood the Administration Building, flanked on either side by companion edifices, one devoted to history, the other given over to historic art. Around this central trio were grouped buildings containing exhibits illustrating the progress made during the last three centuries in all branches of commercial endeavor. The United States government exhibits were housed in buildings of Colonial stamp costing approximately $350,000. All the Federal contributions were particularly interesting, among them many facsimiles of famous documents, such as the Declaration of Independence and the message embodying the Monroe Doctrine; the swords of Washington, Jackson, Taylor, Harrison, and Grant; a small replica of the Bureau of Engraving and Printing, and a working model of a mint. The War and Navy departments contributed a most brilliant and comprehensive exhibition. Other points of general interest were: A complete village of arts and crafts, exemplifying the processes of handiwork common to Colonial home-life; a special exhibit by the Bureau of American Republics; a Convention Hall seating 5,000 persons, and a reviewing stand accommodating 2,000 sightseers. But probably ahead of all in historical interest was the production of old Jamestown as it appeared three centuries before, and the reënaction of the famous encounter between the first ironclads, "Monitor" and "Merrimac" (*qq. v.*), on the identical spot of the original conflict.

Congress appropriated about $2,000,000 for the entertainment of visiting armies and navies, and for building. Various States in the Union contributed generously toward general expenses. Perhaps the most spectacular and singular feature of the whole exposition, as well as its striking physical characteristic, was the magnificent water basin constructed by the government at a cost of nearly $500,000. It projected a half-mile into Hampton Roads and consisted of two piers, each two hundred feet wide, which were joined at the farther end by a connecting pier of the same width, the latter arched in the center to permit passage for small craft. Tall towers were erected at the ends of the main piers for the exhibit of the lighthouse service and wireless telegraphy. At night the whole stretch of pier-way was illuminated with thousands of incandescent lights. The enclosed harbor or basin, with an area of 1,280,000 square feet, was used as a locale for water sports. Open-air athletics formed an important part of the exposition and boasted one of the most elaborate schedules ever arranged. Among other memorable sporting and out-of-door activities were the international yacht races, an international motor boat carnival, an international rowing regatta, and aërial navigation tests and contests, the latter for both commercial and military advantages.

Jamestown Weed. See DATURA.

Jamieson, John, a Scotch scholar; born in Glasgow, March 3, 1759, studied for the ministry, and in 1781 was ordained pastor of the Secession (Anti-burgher) congregation at Forfar. In 1797 he was translated to Edinburgh. Jamieson's reputation rests on his "Etymological Dictionary of the Scottish Language" (1808-1809; supplement 1825). It is a work of great industry, and of very considerable value as a collection of Scotch words, phrases, customs, etc. His preliminary dissertation on the "Origin of the Scots Language" is an elaborate attempt to prove that the Scottish language is really the Pictish language, and that the Picts were not Celts, but Scandinavian Goths. Jamieson also wrote on the Culdees, on the affinities of the Greek and Latin languages to the Gothic, on the royal palaces of Scotland, etc. He died in Edinburgh, July 12, 1838.

Jamin, Jules Célestin (zhă-măn′), a French physicist; born at Termes, Ardennes, May 30, 1818. He was a professor at the Collège Louis le Grand and the École Polytechnique, Paris, and dean of the Faculty of Science. His researches in electricity, magnetism, and optics are highly esteemed. He invented an electric arc-light, and published text-books of physics. He died Feb. 12, 1886.

Janaushek (yän′ō-shek), FRANCESCA ROMANA MAGDALENA, a Polish actress; born in Prague, Bohemia, July 20, 1830. She began her career on the stage in Cologne, playing in that city and in Frankfort from 1848 to 1860. She afterward appeared in Dresden and all the principal cities of Germany, everywhere winning distinction. In 1852 she was married to Capt. Frederick Pillot, of the German navy. She made her first tour in America in 1867-69, playing Medea and other rôles in the German language, and securing at once the most favorable criticism. Upon returning to Germany she studied English, and in 1873 made her second visit to the United States, when she played the most exacting Shake-

spearean rôles, such as Lady Macbeth, in the original tongue. She was also very successful in the tragic rôles of Meg Merrilies and Mary, Queen of Scots, and won praise in double rôles in "Bleak House" and other plays. Having retired from the stage in 1898, she made her home in Brooklyn, N. Y. She died in Amityville, L. I., Nov. 29, 1904.

Janana. See ZENANA.

Janda, Bohumil (yän'dä), a Bohemian novelist and poet; born in Patek, May 1, 1831. His poetry and prose deal mostly with historical themes afforded by the annals of his native land. "Jan Talafús z Ostrova" is his masterpiece in meter, being an epic of a fifteenth-century knight. His novel "Anna Městecká Boček" is based upon somewhat similar material. He died Sept. 29, 1875.

Jane, Frederick T., an English naval writer and novelist; born in 1865. He was originally intended for the navy, but became a writer instead. He published "Blake of the 'Rattlesnake'" (1895); "The Incubated Girl" (1896); "To Venus in Five Seconds" (1897); "The Lordship, the Passen, and We" (1897); "All the World's Fighting Ships" (1898–1899); "The Torpedo in Peace and War" (1898); "The Jane Naval War Game" (1898); and various review articles on naval subjects.

Janesville, a city and county-seat of Rock co., Wis.; on both sides of Rock river, and on the Chicago, Milwaukee and St. Paul, and the Chicago and Northwestern railroads; 70 miles W. S. W. of Milwaukee and 91 miles N. W. of Chicago. It is the farming trade center for five counties, having a population of 120,000; and its manufactories include flour mills, woolen mills, machine shops, foundries, carriage factories, and breweries. Janesville is the seat of St. Joseph's (R. C.) Convent, State School for the Blind, and Oak Lawn and Palmer Memorial Hospitals. There are 2 National banks, daily, weekly, and monthly periodicals, and an assessed property valuation of over $2,000,000. Pop. (1890) 10,836; (1910) 13,894.

Janet, Paul (zhan-ā'), a French philosopher and essayist; born in Paris, April 30, 1823. He received important professorships in acknowledgment of the services conferred upon education by "The Family," "Studies of Dialectic in Plato and in Hegel," "Masters of Modern Thought." He died in 1899.

Janeway, Edward Gamaliel, an American physician; born in New York, Aug. 31, 1841. He was graduated at Rutgers in 1860 and at the New York College of Physicians and Surgeons in 1864. He practised in New York, and after 1873 was Professor of Pathological Anatomy at Bellevue Hospital Medical College, being an authority on the heart. In September, 1901, he was summoned to the bedside of President McKinley, as a consulting specialist.

Janeway, Jacob Jones, an American clergyman; born in New York city, Nov. 20, 1774; was graduated at Columbia College in 1794; was pastor of the Second Presbyterian Church in Philadelphia in 1799–1828; Professor of Belles-lettres, Evidences of Christianity, and Political Economy at Rutgers College in 1833–1839. He was the author of "The Apostolic Age"; "Exposition of the Acts and of the Epistles to the Romans and the Hebrews" (3 vols. 1866); "Internal Evidence of the Bible"; "Unlawful Marriage" (1844); "Review of Dr. Schaff on Protestantism"; and "The Abrahamic Covenant" (1812). He died in New Brunswick, N. J., June 27, 1858.

Janin, Jules (zhä-n*ang*), a French critic, journalist, and novelist; born in St. Etienne, Feb. 16, 1804. He caught the fancy of the Parisians with his literary and theatrical criticisms, displaying an incredible aptitude for detecting the public taste and guiding himself wholly by it. In 1870 he was elected to the French Academy. Among his stories and novels, "The Dead Donkey and the Guillotined Woman," "Confession," and "A Heart for Two Loves," are conspicuous. His permanent work is probably the collection of papers called "History of Dramatic Literature." He died in Paris, June 19, 1874.

Janina, or **Joannina** (yän-ēn'ä), capital of a vilayet in Turkish Albania, on a lake (12 miles long by 3 broad) of the same name, 50 miles inland from the shore opposite the island of Corfu. Its buildings include more than 20 ecclesiastical edifices, and the ruined castle of Ali Pasha, whose headquarters were at Janina. Goldlace is extensively manufactured, as well as morocco leather, silk goods, and colored linen. The population, which numbered 40,000 under Ali Pasha, is now about 20,000, of whom some 15,000 are Greeks; Greek is the language spoken. The town has been under Turkish rule since 1430.

Janizary, a soldier of the old Turkish footguard; originally young prisoners trained to arms. The Janizaries were a body of Turkish troops, formed originally, about 1330, of the children of Christians who had been conquered and were reared as Mohammedans. Latterly they acted as the imperial bodyguard of the Sultan at Constantinople, but on the ground of being turbulent and dangerous to the State, in consequence of their rising against the Sultan, the force was dissolved June 17, 1826, when 15,000 were executed, and more than 20,000 banished.

Jan Mayen Land, a volcanic island in the Arctic Ocean, named after the Dutch

navigator by whom it was discovered in 1611. It lies between Iceland and Spitzbergen, and is 35 miles long. Its highest point is the extinct volcano of Beerenberg, 8,350 feet, the sides of which are covered with immense glaciers and frozen waterfalls. In 1882–1883 it was made the station of the Austrian polar expedition. Important seal and whale fishings are carried on E. and N. of Jan Mayen every summer.

Jans, Annatje, or **Anneke** (yäns). See BOGARDUS.

Jansenists, a party in the Roman Catholic Church, which arose about the middle of the 17th century, and was attacked by the Jesuits as heretics. The Jansenist propositions were condemned by Pope Innocent X. as heretical; but this by no means ended the dispute, for the Jansenists contended that they were condemned in a sense different from that which they were intended to bear by the author. An appeal was again made to the Pope, and in 1656 a new bull was issued by Alexander VII., declaring that Jansenius meant the propositions in the sense condemned by the previous bull. A formulary was now drawn up, conformably to the new bull, and all ecclesiastical persons were required to sign it, on pain of being suspended from their offices. Most of them refused, and a schism was thus occasioned in the French Church, which lasted for some time. The Port Royalists, Arnauld, Pascal, Nicole, Persault, were conspicuous for their defense of Jansenism, and, not content with acting on the defensive, carried the war into the enemy's country, attacking the Jesuits; one of the ablest of their attacks being the "Provincial Letters" of Pascal. At length, Clement IX., in order to bring about peace, attempted to compromise matters by asking merely a rejection of the five propositions, without ascribing them to Jansenius. The liberal policy of Innocent XI. tended still more to restore peace. In 1698, however, the smouldering fire was again stirred up into a fierce flame by the appearance of Father Quesnel's "Moral Observations on the New Testament." Quesnel was banished from the country; and in 1709 Louis XIV. suppressed and destroyed the monastery of the Port Royal. In 1713 Clement XI. issued his famous bull "Unigenitus," condemning 101 propositions of Quesnel's work. The strife continued for some time after this, and many of the Jansenists emigrated to Holland. A number of the French clergy still hold the principles of Jansenius. While Jansenism remained in France a theological school, it became in the Netherlands an independent Church. In 1704, Codde, the vicar-apostolic of the archbishopric of Utrecht, was deposed by the Pope for holding Jansenistic views; but the chapter refused to acknowledge the validity of this deposition, and in 1723 they chose an archbishop of their own. Since that time they have had an archbishop at Utrecht, and bishops at Haarlem and Deventer. These Jansenists call themselves by preference the disciples of St. Augustine, whose doctrines they maintain, upholding moral strictness, and regarding the inward service of God as the greatest proof of piety.

Jansenius, Cornelius, a Flemish theologian; born in 1585. He founded the body of sectaries in the Roman Catholic Church

CORNELIUS JANSENIUS.

known as JANSENISTS (*q. v.*). He was made Bishop of Ypres, and died in 1638.

Janson, Kristofer Nagel (yän'son), a Norwegian poet; born in Bergen, May 5, 1841. He was a clergyman and educator, and settled in the United States in 1881. "Norse Poems," a collection of lyrics, and "Praerien's Saga," are his most popular works, but he produced many stories of merit. He wrote in both Norse and English.

Janssen, Cornelis, a Dutch painter; born in Amsterdam about 1590. He lived and worked in England from about 1618 to 1648, and acquired a reputation as a painter of portraits and historical subjects. He died in 1665.

Janssen, Johannes (yän'sen), a German historian; born in Xanten, Düsseldorf, April 10, 1829. Distinguished for the zeal and learning with which he contended for the Catholic point of view in various valuable historical studies, he produced in "The History of the German People Since the Close of the Middle Ages" (1877–1894) a masterpiece of energetic controversialism softened by a happy style. He died in Frankfort-on-the-Main, Dec. 24, 1891.

Janssens, Abraham, a Dutch painter; born in Amsterdam about 1570. His most famous pictures are the "Entombment of Christ" and the "Adoration of the Magi." From his vigorous drawing and admirable coloring he ranks next to Rubens among the historical painters of the period. He died in Antwerp in 1632.

Janszoon, Laurens. See COSTER.

Jantu (jan'tö), a water-raising machine of great antiquity, used in Bengal for irrigation. It is a trough, counterweighted by an extended arm and balanced across a bar. As the trough end descends it dips water, and as it rises the water runs toward the axis of vibration, and escapes at a lateral orifice into a trough, which conducts it to the field.

Januarius, St., or **San Gennaro,** a martyr of the Christian faith under Diocletian. He was a native of Benevento, or at least became bishop of that see in the later part of the 3d century. According to the Neapolitan tradition, he was taken prisoner at Nola; and the place of his martyrdom, in 305, was Pozzuoli, where many Christians suffered the same fate. His body is preserved at Naples, in the crypt of the cathedral, and in a chapel of the same church are also preserved the head of the martyr, and two phials supposed to contain his blood. On three festivals of each year — the chief of which is the day of the martyrdom, Sept. 19, the others the first Sunday evening in May and Dec. 16, as well as on occasions of public danger or calamity, as earthquakes or eruptions, the head and the phials of the blood are carried in solemn procession to the high altar of the cathedral, or of the church of St. Clare, where after prayer of longer or shorter duration, the blood, on the phials being brought into contact with the head, is believed to liquefy, and in this condition is presented for the veneration of the people or for the conviction of the doubter. It occasionally happens that a considerable time elapses before the liquefaction takes place, and sometimes it altogether fails. The latter is regarded as an omen of the worst import; and on those occasions when the miracle is delayed beyond the ordinary time the alarm and excitement of the congregation rise to the highest pitch.

January, the first month of the year. It was among the Romans held sacred to Janus, from whom it derived its name, and was added to the calendar along with February by Numa. It was not till the 18th century that January was universally adopted by European nations as the first month of the year, though the Romans considered it as such as far back as 251 B. C.

Janus (jān'us), one of the divinities of ancient Rome, and the only one having no equivalent in the Grecian mythology. He was represented as a son of Apollo, and as having built a small town on the Tiber, which he called Janiculum. As the name implies, Janus was the god of doors and gates, and in token of his office carried a key in his hand. The first month of the English year receives its name from him, and he presided over the dawn of every day and the commencement of every undertaking. Janus was usually represented with two heads, looking in opposite directions. His temple at Rome was kept open in the time of war, and shut in time of peace.

JANUS.

Janvier, Margaret Thomson, an American author; born in New Orleans, La., in 1844, sister of Thomas Allibone Janvier; wrote juvenile stories and verses. Her publications include "Under the Day-Star"; "Clover Beach"; "The Dead Doll and Other Verses"; "The Queen's Body-Guard"; "Doris and Theodora"; "Ways and Means"; "Absent-Minded Fairy," etc.

Janvier, Thomas Allibone, an American author; born in Philadelphia, Pa., July 16, 1849; received a common school education; engaged in newspaper work in his native city in 1870–1881; lived in New York during most of the period 1884–1894, and then went abroad. He is the author of "Color Studies" (1885); "The Mexican Guide" (1887); "The Aztec Treasure House" (1890); "Stories of Old New Spain" (1891); "In Old New York" (1894); "In the Sargasso Sea" (1898); "The Passing of Thomas and Other Stories" (1900); etc.

Janville, Countess Gabrielle de Martel de. See GYP.

Japan (native name Dai Nipon, or Niphon, that is, "Great Nipon," the latter word meaning Sunrise or East), an island empire in the North Pacific Ocean, off the N. E. coast of Asia, consisting of an archipelago comprising three large mountainous and volcanic islands — Niphon or Hondo, Kiusiu, Sikok — and an immense number of smaller, forming together Japan proper; of the large island of Yezo, N. of Hondo, and separated from it by the Strait of Sangar or Matsmai; of the long chain of

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the Kurile Islands, between Yezo and Kamchatka; of the Loo-Choo Islands, stretching S. W. toward Formosa; of Formosa and the small Pescadores Islands, both acquired as a result of the war with China; and of Korea, annexed in 1910. The Japanese insular dominions are separated from the Asiatic continent by the Sea of Okhotsk, the Sea of Japan, the Strait of Korea, the Eastern Sea (or Tong Hai), and the Strait of Formosa or Fokien. The area of Japan proper is estimated at 111,230 square miles. Yezo, now commonly called Hokkaido, has an area estimated at 36,300 square miles, and adding the Kurile Islands, the Loo-Choo Islands, and Formosa (area 13,300 square miles), the total area of the empire is about 147,655 square miles. The term Niphon, often used for the largest island of the group, is really the name of the empire. By the Japanese themselves this island is called Hondo or Honshiu. The capital of the empire is Tôkyô; other important towns are Osaka, Kioto, Nagoya, Kobé, Yokohama, Hiroshima, Nagasaki. Pop. (1909) 49,769,704.

Physical Features.— The largest island, Niphon or Hondo, is upward of 700 miles long N. E. and S. W., breadth varying from 50 to 100 miles; Kiusiu, on the S. W., separated from Niphon by the Strait of Shimonoseki, which in one part is narrowed to 2 miles in width, is about 200 miles long N. to S., and 120 miles broad; Sikok, the third and smallest of the three principal islands, is 140 miles long by 60 miles broad. It lies E. of Kiusiu, and is separated from it by the Strait of Bungo, which at its narrowest part is not more than 10 miles broad. The straits which divide Sikok from Niphon are scarcely broader and are thickly set with small islands. The more or less inclosed stretch of sea between Kiusiu, Sikok, and Hondo is known as the Inland Sea. Yezo is of a roughly triangular form, having its sides respectively 300 miles, 260 miles, and 220 miles in length. It is separated from Niphon on the S. E. by the Strait of Tsugar, Matsmai, or Sangar, about 8 miles broad in the narrowest part. West of Niphon lies the important island of Sado. The coasts of the larger islands are extremely irregular, being deeply indented with gulfs, bays, and inlets, which form magnificent harbors. The surface also is generally uneven, and in many instances rises into mountains of great elevation. This is especially the case in the island of Niphon, which is traversed throughout its whole length by a regular chain of mountains, the highest peak of which, Fusi-yama (Rich Scholar Peak)— a dormant volcano covered with perpetual snow— is 13,977 feet high; but the elevation of the range is in general so low as to admit of cultivation up to the watershed of its streams.

The Japanese Islands form a part of the line of volcanic action which commences in the N. with the Aleutian Isles, passes through the Philippines, Sumbawa, and Java to Sumatra, and then in a N. W. direction to the Bay of Bengal. The volcanic vents which indicate the direction of the line are numerous in Yezo, Niphon, and Kiusiu; earthquakes, often causing great devastation, are of frequent occurrence, and it is calculated that every seven years a Japanese city is destroyed by their agency. In Yezo some dreadful eruptions have occurred — one in 1783 destroyed 23 villages; and the volcano of Wunzendake, one of five active in the island of Kiusiu, is the terror of the surrounding inhabitants — an eruption of it in 1792 having destroyed 53,000 people. Almost equally disastrous was the tidal wave in 1896, which, besides causing the death of over 26,000 people, injured many thousands more and destroyed a vast amount of property. The prevailing formations in these islands are trachyte and basalt; plastic clay, marl, and felspar occur in various localities; and there are whole mountains of porcelain earth. The metallic wealth of the empire is known to be very great, comprising gold, silver, copper, tin, lead, and iron. The island of Sado is particularly mentioned as rich in gold. Both the tin and copper of Japan are considered to be of very superior quality. Coal is found in various parts, and the output is rapidly increasing, though it does not as yet much exceed 5,000,000 tons annually. Petroleum is becoming a product of some consequence. Sulphur abounds; thermal and mineral springs are of frequent occurrence; and ambergris is met with on some of the shores. Streams are numerous in Japan, but have very short courses and are for the most part rather torrents than rivers.

Climate.— The climate of Japan, though extremely varied — being intensely cold in the N., and about as warm as the South of France in the S.— is, on the whole, much milder than its latitude would indicate; owing chiefly to the influence of the surrounding ocean. A remarkable difference of climate exists also between the E. and W. shores; the cold being more intense on the latter than the former, owing to the proximity of the Asiatic continent; while the E. coasts are protected from the cold continental winds by the lofty central ridge of mountains traversing the island from N. to S. From March to the second half of May a splendid spring prevails; from June to September summer extends, introduced by heavy rains followed by intense heat; from September to the end of November there is a brilliant autumn; and three months of winter succeed, rendered not unpleasant by the continued serenity of the sky. In Kiusiu and in the S. parts of

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Niphon, the thermometer ranges between 29° and 104° F., 80° being the average in the middle of summer, and 35° in the coldest months of winter. In lat. 32° N. ice is formed of several lines in thickness; in lat. 36° the lakes are covered with a sheet of ice, and in 38° to 40° the ice becomes so thick that the rivers may be crossed on it; while in Yezo, near Cape Saga, lat 45° 21′ N., winter is so severe as to drive the hardy Ainos to the protection of caverns. Rain is very frequent; hurricanes and waterspouts also occur often, and typhoons and equinoctial gales frequently sweep the seas about the change of the monsoons.

Vegetation.— Vegetation of the Japanese islands is exceeding varied, the products of the tropics being intermingled with those of the temperate and frigid zones. The palm, banana, bamboo, bignonia, and myrtle flourish in the S., while in the N., more especially in the island of Yezo, oaks and pines abound. The forests of Yezo cover an area perhaps nearly equal to that of Ireland and form a source of wealth that is as yet comparatively neglected. The finest of the Japanese indigenous trees are the evergreen oak and the maple. Sweet oranges, pomegranates, pears, apricots, peaches, and over 500 of the principal ornamental and useful plants are of foreign origin, having probably been introduced from Korea and China. The camphor and varnish trees are indigenous. The kadsi, or paper tree, a species of mulberry, grows naturally in the fields, and furnishes textile fibers from which paper is produced; paper is also made from various other plants. The chrysanthemum is a common and favorite plant and has become an emblem of Japan. The flora as a whole resembles that of a great part of North America.

Agriculture.— The soil of Japan is naturally indifferent; but the patient industry of the agriculturists favored by the genial climate has covered with vegetation every spot capable of bearing anything. In the S. the sugar cane is cultivated with success; and rice yields two harvests and constitutes the chief article of food. Wheat and barley, maize and millet are grown to an important extent, and buckwheat, potatoes, melons, pumpkins, and cucumbers in great abundance. Ginger, pepper, cotton, hemp, and tobacco are cultivated in considerable quantities; and there are extensive plantations of the tea plant — yielding, however, a produce inferior to that of China. Silk is also a Japanese product of importance.

Zoölogy.— Buffaloes and zebus are common; but they are used only for carrying burdens and for agricultural purposes. Horses of various breeds — but generally small — are numerous. There are neither asses nor mules, and sheep and cows are few. In consequence of the general cultivation of the soil, the wild animals are necessarily few in number; but bears, hyenas, deer, hares, foxes, and wild boars are still found in the N. of Niphon. Dogs are common; but though cats exist in thousands, the country is said to be overrun with rats and mice. Among the animals are flying squirrels and monkeys. There is a great variety of birds — including song birds, birds of prey, birds of the pheasant kind, and in particular, numerous water birds, of which the cormorant is trained to catch fish for its owner. Domestic fowls are very common. Snakes are not infrequent and at least one species is venomous; there are also tortoises, lizards, scorpions, and centipedes; and of the insect tribes there are white ants, winged grasshoppers, and several beautiful varieties of moths. The seas abound in fish, which are taken in great quantities. The rivers of Yezo supply abundance of salmon.

People, Religion, Language, etc.— The Japanese may be regarded as belonging to the great Mongolian family of peoples (apart from the Ainos of Yezo, who are of different race). They are distinguished by broad skulls and high cheek bones; small black eyes, obliquely set; long black hair; and a yellow or light olive complexion; some are good looking and many are well made, active, and nimble. Apart from members of the imperial family, they are now divided socially into three classes; *kwazoku* or nobles, *shizoku* or knights, and *heimin* or common people; and the classes are kept distinct with all the strictness of caste. Till 1868 feudalism prevailed in Japan and the chief nobility were feudal princes called *daimios*. The nobles are now divided into five ranks, corresponding with prince, marquis, count, etc. Among the chief moral characteristics of the Japanese are perseverance, courage, and frankness, with good humor, natural politeness and a large measure of self-confidence. The agricultural population in particular are distinguished for their industry, temperance, and courteous hospitality. The Japanese dress consists of loose garments of silk or cotton gathered in at the waist and fastened by a girdle, the men of the higher orders wearing a kind of petticoat trousers. Formerly they wore no hats except in rainy weather and shaved the whole front and crown of the head, forming the rest into a tuft on the bald skull. At the present day, however, though the national costume has by no means been discarded, European dress is commonly worn by the upper classes on formal occasions and during the discharge of official duties; and the Western method of dressing the hair is almost universally adopted.

The women keep their hair very long, and usually wear on their heads numerous costly ornaments of tortoise shell. Their dress very much resembles that of the men. They destroy their natural complexions with

paint, color their lips purple, and when married, blacken their teeth and pluck out their eyebrows. Polygamy is not practised, though the moral code of the Japanese is not otherwise by any means particularly rigid, various laxities being indulged in without scandal. Legal concubinage was abolished in 1880. The Japanese are slaves to custom and very strict, often oppressive, etiquette; and though much has been borrowed from the Western nations in recent times, the Japanese will not be likely to give up many of their manners, customs, and ways of living, their foods and methods of cooking, their lightly constructed houses, etc. The established or State religion is that of Buddha, which is, however, exotic and comparatively modern, although another and older faith also exists, called Shinto or Shin-Syu (faith in gods, or ways to gods). There are a large number of nominal Christians in Japan, the Protestant missions reporting 30,000 members, though probably motives of self-interst — such as the obtaining of a free Western education in the mission schools — sometimes underlies so-called conversions to the Christian faith. There are no fewer than eight sects of Buddhists. The Japanese language is not monosyllabic (like Chinese), but agglutinate, and has an alphabet of 47 letters which are written in two different forms, one rendered complex by the addition of variations, known as the *Hiragana* form of character; and the other, the *Katagana* character, entirely without variations and consequently much simpler. The literature of Japan is copious and includes works in all departments, historical, scientific, and imaginative, generally based on Chinese classics.

Government Administration, etc. — The government of Japan was, till lately, a hereditary absolute monarchy, vested in the mikado, or emperor. This was the ancient form, but in 1585 the emperor's commander-in-chief usurped the governing power, and for nearly three centuries reduced the mikado to a secondary position. The latter resided in the royal and sacred city of Miako (or Kioto), where he was kept secluded under the guise of a mysterious sancity; while the shogun, living in Tokyo, exercised imperial authority, and was regarded, by foreigners at least, as a second and supreme sovereign. In 1868, however, a revolution overthrew the power and office of the shogun — he had been usually, but erroneously, called by a Chinese title, tycoon — and the mikado was restored to his ancient supremacy. In 1889 Japan received a constitution, becoming a constitutional monarchy. The mikado is sovereign of the empire, can declare war, make peace, and conclude treaties; and exercises executive powers with the advice and assistance of his cabinet, who are appointed by himself. He is also assisted by a privy council, who give their advice in important matters when consulted. The cabinet includes the prime minister and the statesmen at the head of the foreign office, treasury, war, navy, education, public works, etc. The legislative power is vested in the mikado and the Diet or Parliament, which consists of two houses, a house of peers and a house of representatives. The former consists of members of the imperial family, princes, and marquises; counts, viscounts, and barons elected by their respective orders; and a certain number of persons nominated by the emperor and by a few wealthy taxpayers, the total number being about 300. The house of representatives numbers 300; the members being elected for a period of four years, so many from each electoral district. They are paid, as are also the nominated members of the house of peers. In 1876 a new division of the empire into districts for local government was made, and the number is now 46, namely 43 *ken* or rural districts, and 3 *foo* or residential districts: Tokyo (Yeddo), Osaka, and Kioto. The ordinary revenue for 1899–1900 was estimated at £18,302,000, the expenditure at £14,448,000; the total revenue, £25,312,000; expenditure, £25,260,000. In 1899 the debt was over £40,000,000. The receipt of the Chinese war indemnity has had great importance in Japanese finance. Every Japanese, after reaching the age of 20, has to serve three years in the army. The army on a peace footing in 1900 numbered 603,116 of all ranks.

Modern Progress. — On the abolition of the shogunate in 1868 Japan entered on a program of reform on Western lines. This progressive movement was chiefly, if not solely, the result of political foresight. The Japanese at heart are as anti-foreign as their Chinese neighbors; but, unlike the latter, they have grasped the fact that Western encroachment can only be checked by Western methods. When the progressive and sagacious statesmen of Japan perceived that their existence as a nation depended on meeting the great powers of the West on their own ground, they determined on a thorough and comprehensive metamorphosis. Not only was the youth of Japan sent to Europe for the purpose of acquiring Western sciences, but foreign advisers were called in wholesale to reorganize the army and to instruct the nation in the ways of the West. The first innovation was the construction of a railway in 1869, and since that date an immense railway system has been developed, chiefly for strategical purposes, and latterly with but little assistance from foreign engineers; so that at the present day there are over 3,600 miles of railroad in the four principal islands of the Japanese empire. About a third of this total mileage has been built by the govern-

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ment, the remainder being due to the enterprise of private capitalists. The year 1881 witnessed the formation of the first Japanese railway company, and since that date the number of them has largely increased. From the outset the railways proved a success and at the present day they are said to be financially in a flourishing state.

The building up of a powerful and efficient navy — as was proved by the war with China in 1894 — was one of the first considerations of the Japanese government; and not contented with merely organizing a fleet, they prepared for the chronic industrial warfare, which is the inevitable condition of modern life, by subsidizing the construction and the maintenance of a mercantile marine. Determined to make themselves independent of Europe and America, the Japanese established dockyards and arsenals, at which modern ships and armaments are now turned out under foreign supervision, and frequently by native engineers unaided by Europeans. Though the workmanship attained in the latter case is not, generally speaking, on a level with that of the West, it is admitted that the Japanese are making rapid progress in engineering and shipbuilding. The problem of education received the early attention of Japanese reformers. Commissioners were dispatched to Europe in 1871 charged with the task of mastering the essential points of Western education. On their report an educational code, which has since been frequently revised, was drawn up. Schools were established, where they did not already exist, all over the country. Today the elementary schools number considerably over 26,000; in addition to which there are various kinds of establishments for secondary and technical education. In 1877 the Imperial University of Tokyo was founded through the amalgamation of certain technical schools, and embraces colleges of law, medicine, engineering, literature, science, and agriculture. A staff of foreign professors was imported, and to their devoted services Japan, in the first instance, owes the remarkable success of an experiment which is unprecedented in the history of nations. There is also a university at Kioto.

The new conditions of life necessitated the abolition of Japan's traditional code of laws which she proceeded to replace with a legal code borrowed from the West; and to these laws foreigners in Japan since the nullification of extra territoriality in 1899 are now obliged to submit themselves. Though the native industries may be said to die hard in Japan, the country has undergone during the last few years little short of an industrial revolution. The modern factory has sprung up in all directions. There are 70 cotton mills altogether at the present day, besides a vast number of factories employing a great amount of labor in match making, printing, the manufacture of paper, porcelain, lacquer ware, boots, clothing, and many other branches of industry. Few modern trades, from the construction of steam engines to the making of bread by machinery, are unrepresented in modern Japan; and it is a significant fact that within a decade exports of manufactured goods from Japan have increased at more than double the rate of imports. A difficult problem has been the procuring of factory hands. The Japanese are artists in their native handicrafts; they object to mechanical employment which is calculated to rob them of all artistic pleasure and to transform them into mere machines; and, above all, they are inured to cleanliness. To attract artisans to desert their traditional workshops for the dirt and automatic toil of the modern factory, employers of labor have been compelled to pay a high and increasing rate of wages. In this circumstance, coupled with the fact that Japan has adopted a protective policy in regard to imports, which include machinery and raw material, lies the chief safeguard of the foreign competitor for some time to come.

The inclination to sharp practice in business stands out in remarkable contrast to the unquestionable purity of Japanese politics. Its explanation is to be found in the fact that Japanese merchants, aware of the colossal frauds which are legitimately perpetrated every day in Western countries, wish to meet foreigners on what they believe to be their own ground. In justice to the Japanese it should also be stated that foreign merchants, who, before the revised treaties came into operation, were compelled to enter into partnership with natives for the purpose of trading outside the treaty ports, were rarely taken advantage of. When the Japanese have grasped the fact that a large proportion of foreign traders are honest, complaints against their commercial integrity will undoubtedly disappear, and they will prove equally compliant in this as in other matters. Side by side with the modern development of their country the Japanese have preserved a remarkable spirit of patriotism. A law has been passed binding the government to accept tenders for contracts from native firms only, though the enactment is outwitted by foreign quotations being passed under cover of dummy Japanese firms; and private individuals among the Japanese have subsidized the carrying out of the great engineering works sooner than permit work to be handed over to a foreign contractor. In 1897 Japan adopted a gold currency and placed herself thereby on a financial level with the civilized powers of the West.

Exports and Imports, etc.— In the year 1900 Japan exported goods to the value of

£20,868,895, of which those classed as agricultural amounted to £6,930,628; manufactures to £7,244,206; mining to £3,539,233; marine to £428,035; miscellaneous, £2,726,-923. Silk and silk goods form the chief export, others of importance being coal, copper, tea, cottons, rice, matches, porcelain, mats. The imports in 1900 had the value of £29,324,646, the chief items being cotton, raw and manufactured, metals, sugar, woolens, machinery. Great Britain has by much the largest share in the foreign trade, though the trade with Germany and the United States is making rapid advances. In 1900 British vessels with a total tonnage of 3,820,804 tons entered the open ports; the German vessels had a tonnage of 1,068,914. Yokohama and Kobe have by far the greater share of the trade. The Japanese standard money unit is the gold yen, nearly equivalent to 49.8 cents.

History.—Marco Polo is the first European traveler who speaks of Japan, called by him Cipango, or Zipangou. In 1542 it was reached by Mendez Pinto, and shortly afterward the Portuguese obtained permission to settle at Nagasaki, and established a highly lucrative trade. In 1549 the Jesuit missionary Francis Xavier arrived, and by his means and that of his followers many of the natives were converted to the Church of Rome. But the government becoming jealous of the Portuguese and irritated at the interference of the missionaries with the religious profession of the people, in 1585 expelled the traders and compelled the native converts to return to their former faith. Several severe persecutions of the Christian converts ensued and in one day 37,000 are said to have been massacred. But these persecutions partook much more of the political than of the religious character; and it was the undue interference of the Portuguese with the natives, and the not unfounded dread of their establishing a permanent dominion in the country that incited the Japanese authorities to the perpetration of these enormities. Hence the Portuguese were finally expelled; and in 1640 the members of an embassy sent from the government of Cacao to the Emperor of Japan were barbarously murdered by order of the latter, with the exception of 12 persons reserved to carry back the intelligence as a menace to their superiors. The Portuguese never afterward recovered a footing in the country. Previous to this the Dutch had in 1600 succeeded in establishing commercial relations with Japan, which by their prudent management they continued to maintain notwithstanding the general proscription of all Christian powers, and till recently were the only European nation that possessed any intercourse with the country.

The first attempt in modern times to reopen a commercial intercourse was made by the United States which, March 31, 1854, succeeded, through the agency of Commodore Perry, in concluding a treaty by which the ports of Shimoda, in the island of Niphon, and Hakodate, in Yezo, were to be opened to American ships, but only for effecting repairs and obtaining supplies of provisions and fresh water. In October of the same year Admiral Sir James Stirling concluded on behalf of Great Britain a similar treaty by which the harbors of Nagasaki and Hakodate were to be opened to British ships for the same purpose. A much more important treaty, however, was effected by Lord Elgin with the Japanese government on Aug. 26, 1858, by which five ports were opened to free commerce with Great Britain, under payment of certain fixed duties. The American government had a short time previous concluded a similar treaty with Japan, and other treaties of a like nature were soon concluded by various European countries. In 1869 Europeans were also allowed to establish trading houses at Tokyo (the port of which is Yokohama), and since then a number of other ports have been opened to foreign trade. The mission of Commodore Perry to Japan contributed much to inform us as to the condition of the Japanese, and since that time there has been a continual increase in our knowledge both of the country and people.

The revolution of 1868 was not accomplished without internal troubles. Several risings of the nobles, who in consequence of the revolution were deprived of their privileges, and to a large extent of their incomes took place, and that of 1876–1877 taxed the resources of the government pretty severely before it was quelled. In 1894 war with China broke out, ostensibly owing to disturbances in Korea, over which both China and Japan had long claimed a suzerainty, and which had been a frequent source of friction between the two countries on former occasions. Active hostilities began in Korea, from which the Japanese gradually drove out the Chinese troops. A great naval engagement took place off the mouth of the Yalu river, which separates Korea from China, and the result was entirely in favor of the Japanese, who then pushed their way into Manchuria, driving the Chinese before them. Further great successes were the capture of the Chinese fortified port and arsenal of Port Arthur, at the entrance of the Gulf of Pechili, of New-chwang, Wei-hai-wei, and the great part of the Chinese fleet. China then saw that it was hopeless to continue the struggle, and in March, 1895, Li Hung Chang was sent to Shimonoseki to sue for peace. Japan demanded, in addition to a heavy war indemnity, the cession of the Liao-tung peninsula. To these terms China's plenipotentiary ostensibly agreed, but it had

been secretly arranged that Russia should step in and forbid the alienation of territory on the mainland. Accordingly Japan found her demands opposed by Russia, France, and Germany, and was compelled to forego the legitimate fruits of her victory. There is no doubt that Japan's primary object in making war was to check the advance of Russia on Korea. Her statesmen hoped, by the insistance on Western reform, to make Korea a powerful buffer State between their own country and Muscovite aggression; and after the conclusion of the war with China there was a constant — and singularly even — struggle of diplomacy between Japan and Russia for paramount influence in Korea. Instead of the Liao-tung peninsula, the island of Formosa and the Pescadores Islands were ceded to Japan, who was thus obliged to relinquish her design of thwarting Russia's objects in Northern China. A subject which constantly occupied the attention of Japanese statesmen during the 12 years that preceded the war with China was treaty revision. Japan had sacrificed national pride in order to place herself on an equality with the West, her progress had been serious and genuine, and her statesmen protested against the continuation of extra territorial privileges which relegated the country to the level of other barbarous and uncivilized States. Great Britain was the first power to acknowledge Japan's claims to equality, and in July, 1894, a new treaty which was not to take effect for five years was concluded by the two governments. Other powers followed suit and on July 17, 1899, Japan attained her international majority, and will henceforth be treated on an equal footing with the Christian nations of the West. The principal effect of treaty revision has been to throw open the whole of Japan to the foreigners for purposes of travel, trade, or residence.

The War with Russia.— A glance at the map will yield a clearer conception than words of the situation of Japan after her short but brilliant war with China. Separated from her W. shores by the Sea of Japan was Korea, a newly-declared independent empire, in which she had acquired large commercial and industrial interests. The N. boundary of Korea from Pessiet Bay, S. of Vladivostok, to the Gulf of Korea was formed by the Yalu and Tumen rivers, and beyond these streams was Manchuria, a province of China being rapidly occupied by Russia. The projection of this province, with the Gulf of Pe-chi-li on the W. and the Gulf of Korea on the E., constituted the Liao-tung peninsula, terminating in the town of Port Arthur, with Talien-wan a few miles N. On the Chinese mainland, S. E. of Port Arthur, was Wei-hai-wei, occupied under a concession by Great Britain, and further to the S. was Kiao-chow, which Germany had acquired for a coaling station.

Japan saw Russia strengthening her position in Manchuria, especially along the Yalu river; building a great commercial port at Talien-wan, renamed Dalny; and converting Port Arthur into a formidable fortification and naval station, all of which movements from the Japanese view-point menaced the sovereignty of China over Manchuria, the commercial interests of Japan in Korea, and the integrity of Japanese territory. In the meantime disturbing rumors arose of secret treaties between Russia and China for concessions to the former of territory or valuable privileges by the latter. Russia and Great Britain appeared to be struggling for paramount influence in China, Russia seemingly the dominating force.

In 1901 there was published what purported to be the text of the Manchurian convention between Russia and China, in which the former agreed "if no further rebellion occurs and action on the part of the other Powers does not interfere" to withdraw her forces from Manchuria within three years, which would terminate in 1903. In the same year China agreed to permit Russia to station a political resident in Mukden, Niu-chwang, and other places occupied by Russia "till the latter should be satisfied that the pacification of the province should be complete." The two last agreements, suggestive of an occupation that might be extended indefinitely, led Japan to remonstrate against the operations of Russia in Manchuria, and thus began those negotiations which were abruptly terminated by Japan on Feb. 6, 1904. Details of the diplomatic notes and of the opening of the war will be found in the articles on KOREA; MANCHURIA; RUSSIA; RUSSIAN EXPANSION.

By the end of February Japan had destroyed a considerable number of Russian battleships, cruisers, and torpedo boats at Port Arthur and Chemulpo, Korea; had blockaded the naval stations of Port Arthur and Vladivostok; had landed several large armies in Korea; had negotiated a treaty with that empire guaranteeing its independence and integrity, for which the Korean government ordered its army to join the Japanese in the field; and was believed to have induced China to send a co-operating army into Manchuria. The Russians were unquestionably not prepared for a sudden war. Their land and naval forces were widely scattered and far from the scene of the first attack, excepting the fleets at Port Arthur and Vladivostok, and these could not help each other because of local interests. After the Japanese had several times bombarded the fortifications and warships at Port Arthur and were believed to be advancing a strong army in Korea and Manchuria to invest Port Arthur from the rear,

the Russian viceroy, Admiral Alexieff, established new headquarters at Harbin, the "Gibraltar" of Manchuria.

It has not been made public to what extent the alliance between France and Russia would lead the former to aid the latter in the emergency of disaster; but the compact between Great Britain and Japan (1903) for "maintaining the independence and territorial integrity of the Empire of China and the Empire of Korea" is most explicit. After declaring that if either Great Britain or Japan, in the defense of their interests in China and Korea, should become involved in war with another Power, the other party would maintain a strict neutrality, the agreement states (Art. iii.) "If in the above event any other Power or Powers should join in hostilities against that ally, the other High Contracting Party will come to its assistance, and will conduct the war in common, and make peace in mutual agreement with it."

An important episode of the early part of the war was the sending (Feb. 10, 1904) by John Hay, Secretary of State, to the American representatives at St. Petersburg, Tokyo, and Peking of the following note:

"You will express to the Minister for Foreign Affairs the earnest desire of the government of the United States that in the course of the military operations which have begun between Russia and Japan the neutrality of China, and in all practicable ways her administrative entity, shall be respected by both parties, and that the area of hostilities shall be localized and limited as much as possible, so that undue excitement and disturbance of the Chinese people may be prevented, and the least possible loss to the commerce and peaceful intercourse of the world may be occasioned."

At the same time Secretary Hay informed all the Powers signatory of the protocol at Peking of this action, and requested similar action on their part. Favorable responses were received from all the Powers, that of Russia declaring her readiness to recognize the neutrality of China, excepting that "Manchuria, being the field of military operations, shall not be included." J. Inouye.

Japan, to coat wood, metal, or paper with a thick coat of hard brilliant varnish. Japanning involves the baking of the varnished article. The Japanese employ a lacquer obtained from a tree (*Rhus vernix*) by making incisions in the trunk and collecting the juice; this is at first like cream, but becomes black by exposure to the air. Their process is said to be as follows: After the juice has assumed a deep black color, finely pulverized charcoal is added to it. The lacquer is applied to an article several successive coats, each being dried in the sun before the next is put on. It soon becomes extremely hard, and is polished with the smooth stone and water until it becomes as smooth as glass. On this surface ornaments and figures are traced with a brush dipped in a varnish of boiled oil and turpentine. Before this is quite dry, gold or silver leaf is laid on, and the whole afterward receives a finishing coat of varnish.

Japhet, (jā′fet), according to the Hebrew record, the second son of Noah, whose descendants peopled first the N. and W. of Asia, after which they proceeded to occupy the "isles of the Gentiles." The term Japhetic or Japetic was formerly used for peoples of the European stock (nearly as Aryan and Indo-Europeans now) as opposed to Semitic and Hamitic (Asiatic and African).

Japura, an important tributary of the Amazon, rises in Southern Columbia, on the E. side of the Andes, and enters the Amazon opposite Teffe by several arms. Its upper course is broken by many falls, but in the lower part it is navigable for river steamers to nearly lon. 70° W., almost 500 miles.

Jardine, Robert, a Canadian clergyman; born in Augusta, Ontario, Canada, June 19, 1840; was graduated at the University of Edinburgh in 1860; principal of the Presbyterian institute in Calcutta, India, in 1870–1876; returned to Canada in 1879; was pastor of several churches there in 1879–1892. In the latter year he was made principal of the Prince Albert High School. His publications include "The Elements of Psychology and Cognition" (1874); "What to Believe" (1876); etc.

Jaroslav (yär-ō-slaf′), capital of the Russian district of that name; at the junction of the Volga with the Kotorost, 173 miles N. E. of Moscow. The town has broad streets, a fine quay, 2 miles long, beside the Volga, nearly 50 churches, three monasteries, and a theological college; it is the seat of an archbishop. The law college (lyceum) has more than 300 students. The staple industry of the place is the manufacture of cotton stuffs; next comes the weaving of linen, wool, and silk. Jaroslav is an important river-port, and does an active trade in corn (one-half), groceries, and textiles. Pop. (1897) 70,610. The town was founded in 1026, and was the capital of an independent principality till 1471, when it fell to Moscow. The district of Jaroslav, with an area of 13.751 square miles and a pop. of (1897) 1,072,478, is industrially important.

Jarrow, a seaport of Durham, England; on the Tyne; 7 miles E. of Newcastle. Its growth from a small colliery village to the thriving town has been due to the construction of its docks (since 1859), and to the establishment of Palmer and Co.'s iron shipbuilding and marine engine works, blast furnaces, iron foundries, gun factory, etc., which together employ upward of 7,000 hands. At Jarrow in 628 Benedict Biscop founded the Benedictine monastery with which the name Bede is inseparably associated. Pop. (1901) 34,294.

Jarves, James Jackson, an American author; born in Boston, Mass., Aug. 20, 1820; received a fair education; settled in the Hawaiian Islands; established "The Polynesian," the first newspaper published in Honolulu; returned to the United States in 1849 and soon after was appointed a special agent for Hawaii to arrange treaties with the United States, Great Britain and France. He later resided in Florence, Italy, where he spent much time in making art collections. His publications include "History of the Hawaiian or Sandwich Islands" (1844); "Parisian Sights and French Principles seen through American Spectacles" (1855); "The Confessions of an Inquirer" (1857–1869); "Art Studies: The Old Masters of Italy" (1861); "Glimpses at the Art of Japan"; etc. He died in Terasp, Switzerland, June 28, 1888.

Jasher, Book of, one of the lost books of the ancient Hebrews, which is quoted twice (Josh. x: 13: II Sam. i: 18). Regarding its character and contents there has been much speculation. Talmudic and later Jewish authorities identified it variously with Genesis (sometimes called "the Book of the Upright"), Deuteronomy, Judges, etc., to all which notions there is the obvious and fatal objection that the two quotations from it which survive are not to be found in any of these books, and could not possibly be found in the first two, as they refer to incidents which occurred at a subsequent period in the national history. The conjecture of the Syriac and Arabic translators has been adopted by Dr. Lowth, Herder, and other scholars — viz. that the Book of Jasher was a collection of national ballads, recording the warlike deeds of the national heroes or singing the praises of otherwise celebrated men. Gesenius is inclined to adopt the same view, and suggests that it may have acquired its name, "the Book of the Upright," from having been written chiefly in praise of upright men. Donaldson, in an ingenious work, "Jashar" (1854), contended for its being a composition of the age of Solomon, and a work of Nathan and Gad. The actual book could not have been earlier than the age of Solomon, especially if a fragment relating to the building of the temple in the Septuagint of I Kings, viii. be from that work. In the 13th century no less than three different works professing to be the lost Book of Jasher were produced; and in 1751 a preposterous forgery under this name (and ultimately traced to one Ilive, a London printer) created some excitement. It claimed to have been translated from Hebrew by "Alcuin of Britain," and was reprinted in 1829.

Jashi. See JASSY.

Jashpur, a native State of Chota Nagpur, in Bengal; area, 1,963 square miles. The country is a tableland, ranging from 2,200 to 3,500 feet in height, and has excellent soil.

Jasmin, Jacques (zhäs-ma*ng*), a Provençal poet; born in Agen, Lot-et-Garonne, France, March 6, 1798. His origin was of the humblest, and he earned his livelihood as a barber. He wrote: "Curl Papers," a string of quaint verses; "Souvenirs," a series of stanzas, the nature of which is sufficiently indicated by the title they bear; and the narrative poem "Françonette." He developed the possibilities of the language of Provence as a medium of modern literary expression. He died in Agen, Oct. 4, 1864.

JACQUES JASMIN.

Jasmine, or **Jasmin,** the English name of the genus *Jasminum*, and especially of the common species *J. officinale*. It has opposite pinnate leaves, a four or five cleft white, sweet-scented corolla. Gerarde, in 1597, mentions that it was used for covering arbors. Its native country was perhaps Persia. The jasmine of the shops is furnished by *J. officinale* and *J. grandiflorum*. A similar perfume exists in *J. sambac; J. undulatum* has slightly bitter leaves. The bitter root of *J. angustifolium*, ground small and mixed with the powdered root of *Acorus calamus*, is applied externally in the East in cases of ringworm. The flowers of *J. grandiflorum* strung on threads are worn as necklaces by the Hindu women. The root of *J. pubescens* is regarded as alexiteric. The roots of *J. humile* furnish a yellow dye.

Oil of jasmine, an oil obtained from the flowers of *Jasminum grandiflorum*, *J. sambac*, and *J. officinale*, but Professor Watt says that of about 40 species of jasmine in India, nearly all might be used in manufacturing oil and otto of jasmine.

Otto of jasmine, a pomade made by impregnating suet with the scent of jasmine, and leaving it for a fortnight in pure rectified spirit.

Jason, in classic fable, a Greek hero; son of Æson, King of Iolchos, a city of Thessaly. Peleas having usurped the throne

on the death of Æson, the youthful prince was driven from his kingdom. Subsequently in obedience to the commands of the oracle, Jason returned to the city of Iolchos and demanded the surrender of the throne to him, its rightful possessor; to this the usurper consented, if Jason would first sail across the Euxine to the kingdom of Colchis, and there punish the perfidious king, Ætes, who had slain a mutual relative. With this Jason complied, and taking a troop of the bravest Greeks he could get, set sail in the ship Argo, and soon after arrived at the king's court. Ætes readily

JASON.

promised to restore the Golden Fleece, which had been the cause of the kinsman's death, and afford him every satisfaction if he would tame certain savage bulls with brazen hoofs and horns, who perpetually vomited forth flame and smoke, and make them plow a field sacred to the gods. At the same time he was to do some other services, such as killing the dragon who guarded the Golden Fleece, and, finally to finish all his tasks in one day. By the aid of Medea, the king's daughter, an enchantress, to whom he promised eternal love, Jason was enabled to accomplish his several feats, and returned to Thessaly with the Golden Fleece and his wife Medea. Growing, however, weary of her exacting love, Jason divorced Medea and married Glauce, the King of Corinth's daughter. In revenge Medea destroyed her own children by Jason, and sent to Glauce a poisoned garment which burned her to death. Jason was killed soon after by a beam falling on him from the ship Argo, as he slept one day on the shore by his beloved vessel.

Jasper, a mineral of the quartz family, which occurs in the form of rocky masses, often making up large portions of hills of considerable size. In hue it is of various shades of red, yellow, brown, and green, and sometimes arranged in stripes, when it is called ribbon jasper. Its varied colors are generally derived from iron in different degrees of oxidation. Jasper is much used for ornamental purposes, on account of its hardness and susceptibility of taking a high polish. Bloodstone, or heliotrope, is a deep green variety of jasper with blood-red spots. Touchstone is a velvet-black flinty variety, used for testing the purity of gold alloys. The alloy is rubbed on the stone, so as to leave a metallic streak, and the quality is estimated by the brightness of the color when nitric acid is washed over it. The principal deposit of jasper is the gorge of the Kargon, in Siberia. The labor of cutting out the blocks of jasper at this place is enormous. The workmen drill holes five inches apart, the whole length of the block, to the depth required; into these they drive dry birch-wood pegs, which are kept wet till they expand and break off the mass.

This gem, the 12th in the breast-plate of the Jewish high-priest (Exod. xxviii: 20), 1491 B. C., was esteemed by the Greeks and Romans, and is mentioned by Onomacritus, 500 B. C., as the "grass-green jasper, which rejoices the eye of man, and is looked on with pleasure by the immortals." Galen (130–200) recommended the wearing of a jasper hung around the neck, to strengthen the stomach.

Jassy, or **Jashi,** the capital of Moldavia, the N. division of Rumania. The town was almost destroyed by fire in 1827, after which it was rebuilt. The streets are broad, and are paved with asphalt, and the houses mostly one-storied and built of wood. The most noticeable secular buildings are the palaces of the boyars or Rumanian nobles, both in the city and in its environs. The town has a university with about 40 teachers and 170 students. Pop. (1904) est. 79,000, of whom 50,000 are Jews, the rest being Armenians, Russians, gypsies, etc. Jassy was the residence of the Moldavian princes from 1565. Here peace was concluded between Russia and Turkey in 1792. During Ypsilanti's insurrection the town was almost destroyed by the Turkish Janizaries (1822). On a height close to the town is the residence of the former woiwodes or governors of Moldavia.

Jastrow, Morris, an American educator; born in Europe, Aug. 13, 1861; was graduated at the University of Pennsylvania in 1881 and studied in Europe; accepted chair of Semitic Languages in the University of Pennsylvania; became a high authority on Semitic languages, religion and literature. He is the author of "Religion of the Babylonians and Assyrians" (1898); "A Fragment of the Babylonian Dibbarra Epic" (1891); "The Study of Religion" (1901); two grammatical treatises of "Abu Zakariyya Hayyng"; etc.

Jasykov, Nicolai Mikhailovich (yäs-ē′-kov), a Russian poet; born in Simbirsk, March 16, 1803. His earliest verse was in a light and amatory vein (hence his sobriquet "The Russian Anacreon"), but ill health changed the current of his thoughts. His first book is a collection of amorous lyrics, and his last a compilation of religious poetry. The good taste with which he uses the Russian language makes his verse notable. He died in Moscow, Jan. 7, 1847.

Jataka, the name of a collection of legends, containing an account of the 550 previous births of Sâkya Muni, or the Buddha. It forms a part of the "Suttapitaka," or "baskets of discourses," of Pâli literature. These are of great importance as the earliest collection of popular stories, many of which at an early date found their way by one channel or other to the West, and are still current as fables of Æsop or as traditional and apparently indigenous folk-tales.

Jatropha, a genus of *Euphorbiaceæ,* tribe *Crotoneæ.* The seeds of *J. glandulifera* yield an oil highly esteemed as a stimulant application in rheumatism and paralysis. Taken internally, they are violently purgative, irritant, and poisonous, Those of *J. multifida* are also purgative, emetic, and poisonous. The expressed oil of *J. glauca* is used in India as an external application in chronic rheumatism and paralysis; the root of *J. officinalis* is given in Brazil in syphilis.

Jats, the most numerous and valuable section of the agricultural population of the Punjab, number about 4,500,000. They are by many identified with the Getæ; and some of the best authorities accept the theory that they are descended from Scythian invaders of India in prehistoric times. Some scholars believe them cognate with the gipsies.

Jauer (you′er), a town of Prussian Silesia; on the Neisse, 13 miles S. of Leignitz. It is famous for its sausages and its weekly corn market, held regularly since 1404.

Jauregui y Aguilar, Juan de (hou′rā-gē ē ä′gē-lär), a Spanish poet; born in Seville about 1570. His name became universally known in Spain on the appearance of his charming translation of Tasso's "Aminta." He wrote "Orpheus," a long mediocre poem, and a "Poetic Discourse" against the poet Gongora, besides rendering Lucan's "Pharsalia" into Spanish with respectable fidelity to the original, but without its power. He died in Madrid, Jan. 10, 1649.

Jaundice, an affection in which many tissues of the body are stained yellow, particularly the conjunctiva, skin, underneath the finger-nails, the urine, etc. It is caused by the coloring matter of the bile becoming absorbed into the blood from various morbid conditions of the liver, or the duodenal portion of the intestine, either from mechanical obstruction of the bile, or from suppression. The pulse is slow, with thirst, lassitude, lowness or spirits, white stools, and general debility. The first symptom of recovery is the reappearance of bile in the stools, after which the yellowness gradually fades away. It is necessary to distinguish between obstruction and suppression. Jaundice is a symptom, and not a disease *per se,* treatment being directed to the restoration of the biliary secretion to its normal channel. In malignant disease, however, this cannot be looked for.

Jaunpur, the capital of a district of same name in the United Provinces of India; on the Gumti, here crossed by a bridge 712 feet in length. The former capital of a Mohammedan kingdom, Jaunpur has several splendid architectural monuments, including Ibrahim's baths (1420), mosques, and ruins of mosques and of the fort. Pop. (1901) 42,771.

Jaunting Car, a light car used in Ireland in which the passengers ride back to back on folding-down seats placed at right angles to the axle, the occupants having their feet near the ground. There is generally a "well" between the seats for receiving luggage, and a seat in front for the driver.

Java, an island of the Dutch East Indies; between lat. 5° 52′ (St. Nicholas Point) and 8° 50′ (South Cape) S., and lon. 105° 13′ and 114° 39′ E.; is washed on the N. by the Sea of Java, on the E. by the Strait of Bali, on the S. by the Indian Ocean, and on the W. by Sunda Strait; extends almost due W. and E., declining about 15° to the S. The extreme length is about 600 miles, the breadth 40 to 125 miles, the superficial area about 49,000 square miles, the pop. (1901) 28,746,688. Batavia, the capital, had a pop. (1901) 115,887. The coast line is not much developed; a few large bays, protected by islands, furnish safe anchorage for vessels. From end to end of the island (most probably corresponding to a volcanic line of fissure) there is a mountain chain, named Gunung Ken-

dang, and, especially in the W. part of the island, several parallel shorter chains. To the N. there are a few isolated mountains in the alluvial plain. Toward the S. the island falls in general steeply toward the sea. There are 43 volcanoes, several of which are still active. The rivers are generally small, but become torrents when swollen by rain; only a few of them are navigable. The climate depends on the altitude; it is rather hot and unhealthy on the coast, but pleasant in the hills.

The natives belong to the Malay race. The Madurese, in the E. part of the island, the Sundanese, living in the W. part, and the Javanese proper differ in physique and in language. Most of them are Mohammedans, at least in name, for much of the belief of their ancestors survives in the Islam that is now practised. A few tribes, however, profess the old religion (viz., the Baduwis in Bantam and the "Heathen" of the Tengger Mountains). The native Christians number about 12,000, and the Chinese Christians a few hundreds. How many half-castes are counted among the Europeans it is impossible to say. The inhabitants are more civilized than those of the other islands of the archipelago. One of the chief vices is opium smoking, which is a source of income to government, and yields for Java alone about $5,000,000 a year for licenses and profits on the import. There are 39 Dutch Protestant and 21 Roman Catholic clergymen for the whole of the Dutch East Indies, besides those who are working among the natives. Every form of religious belief is free, but proselytizing is strictly prohibited.

The chief wealth of Java consists in its luxuriant vegetation, though the producing power seems to be now a little exhausted, at least to judge from the many diseases by which the plantations have been visited of late. The character of the vegetation varies with the soil and the elevation. The division (of Junghuhn) into four botanical zones, up to 2,000, 4,500, 7,500, and above 7,500 feet altitude, has been commonly adopted. The fauna differs from that of the other islands of the archipelago. The animal kingdom is not very rich; tigers (which are a scourge to some parts of the island), rhinoceros, deer, and wild swine are the chief representatives of the quadrupeds; there are only a few birds that are conspicuous for their plumage, and hardly any that are distinguished by their song. Several species of serpents (some venomous) and crocodiles are found on the island. The geology of Java is still largely undetermined.

The earliest historical references date back to the beginning of the 5th century. In 412 A. D. Fa-Hien visited Hindu colonies in Java. About the year 800 the intercourse of the Hindus with the island appears to have become more important. In 1808 the kingdom of Bantam was incorporated with the Dutch possessions; but these in 1811 became part of the French empire. In the same year Java was occupied by the English, and remained in their hands up to 1817. A short time after the Dutch had resumed possession of Java an insurrection burst out in Jokjakarta in 1825 under Dipa Negara, and the struggle lasted till 1830, when the chief of the rebels submitted to the Dutch authorities. By that time the greater part of the states of the native provinces had been incorporated in the Dutch possessions, which then assumed the extension they have today.

Javary, or **Yavary,** a river flowing into the S. part of the Amazon and forming the boundary between Brazil and Peru. It is navigable throughout most of its course.

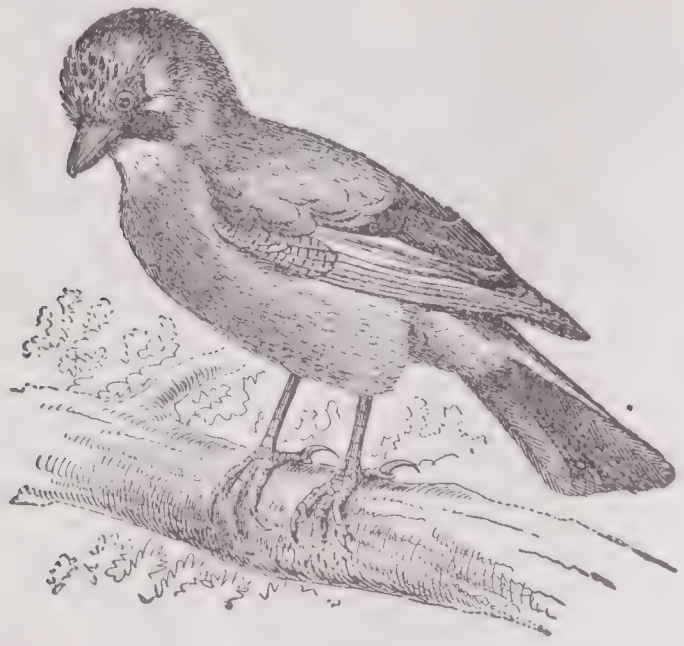
Java Sea, that portion of the Eastern Sea which lies between the island of Java to the S., Sumatra to the W., the islands of Banca, Billiton, and Borneo to the N., and the island of Celebes to the E. The width of the sea between Java and Borneo is 250 miles, and it is crossed by two approved routes to China, the one by the Straits of Macassar, and the other by Pitt's Passage.

Javelin, a light spear thrown by the hand, formerly used by horse and foot in ancient warfare. According to Meyrick, the Velites in the Roman army were armed with seven javelins whose stems were so slender that when they struck the stems bent over, thus making them useless for the enemy. Also a hunting spear, about 5½ feet long, having a wooden shaft and an iron head. It is yet used in Europe in hunting the boar, and by many savage nations in ordinary hunting.

Jaxartes, now called SIHÛN, or SYR-DARIA, a river of Western Asia, which rises at an altitude of 12,000 feet, 30 miles S. of Lake Issik-kul, in the Tian-Shan Mountains. Its total length is 1,500 miles; area of its drainage basin, 320,000 square miles.

Jay, the popular name of *Garrulus glandarius*, a species of *Corvidæ*, of a vinous red color; the back pale gray; the rump and upper tail coverts white; the tail black or gray, with bluish-gray bars; the wing coverts light gray, in the median series light gray inclining to chestnut; the bastard wing or primary coverts barred with black or bright cobalt blue; head with an erectile crest; forehead white, streaked with black. Length about 13 inches. It is a beautiful bird, but attacks peas and other garden crops, to which it is very destructive, especially in the vicinity of woods and forests. It also eats worms, larvæ, and snails. It is often kept as a cage bird. The

common blue jay, *Cyanocitta cristata,* is found over a large portion of South America. The green jay of the United States is



JAY.

Xanthura luxuosa. The long-tailed blue jays are also arranged under *Xanthura,* though they have not the yellow tail which the generic name suggests.

Jay, Antoine (zhā), a French critic and biographer; born in Guîtres, Gironde, Oct. 20, 1770. His early essays on literature won prizes from the French Academy, the reputation thus obtained being fully borne out by his work as an editor on the "Journal de Paris"; by the "History of Cardinal Richelieu's Ministry"; and the "Biographies of Contemporaries," to which he contributed numerous articles. His "Eulogy of Corneille" and "Hermits in Prison" are much quoted. He died in Lagorce, April 9, 1855.

Jay, John, an American statesman; born in New York city, Dec. 12, 1745; was graduated at King's College (now Columbia University) in 1764, and was admitted to the bar in 1768. Elected to the 1st Continental Congress in 1774, and reëlected in 1775, he prepared addresses to the people of Great Britain and Canada and to his own countrymen; drafted the constitution of New York State in 1777, and was appointed chief-justice of the State; was returned to Congress in 1778 and elected its president, and in the following year was sent as minister to Spain. In 1782 he was added by Congress to the peace commissioners, and it was mainly by his efforts that the treaty was brought to a conclusion on terms so satisfactory to the United States. In 1784–1789 he was secretary for foreign affairs. On the adoption of the National Constitution in 1789 he wrote in its favor in the "Federalist"; and after the organization of the Federal government, Washington having offered him his choice of the offices in his gift, he selected that of chief-justice of the Supreme Court. In 1794 he concluded with Lord Grenville the convention familiarly known as "Jay's treaty," which provided for the recovery by British subjects of pre-revolutionary debts and by Americans of losses incurred by illegal capture by British cruisers, and the determination of the E. frontier of what is now the State of Maine; the British were to surrender the W. posts held by them in 1786, and there was to be reciprocity of inland trade between the United States and British North America. The treaty, though favorable to the United States, was passionately denounced by the Democrats as a surrender of American rights and a betrayal of France; but it was ratified by Washington in August, 1795. Jay was governor of New York from 1795 to 1801. Then, though offered his former post of chief-justice, he retired from public life, and passed the remainder of his days at his estate of Bedford, Westchester co., N. Y., where he died, May 17, 1829.

Jay, William, an English clergyman; born in Wiltshire, May 6, 1769; worked at his father's trade, that of a stonecutter and mason, till his 16th year. In 1791 he was called as pastor of Argyle Chapel at Bath, which position he occupied for 62 years. Jay was an impressive and eloquent preacher; he began preaching when only 16. As a writer he produced several works which attained a rapid and very extensive popularity. Among them are "Morning and Evening Exercises," "Short Discourses," "The Christian Contemplated," "Lectures on Female Scripture Characters," and an "Autobiography" (1854). He died Dec. 27, 1853.

Jayadeva, a Hindu poet; born in Kenduli, Bengal, in the 12th century. His great work is the "Gîta Govinda," a Sanskrit lyric drama, in which is celebrated the love of Krishna and his wife Radha. The Hindu commentators give the poem a mystical interpretation. As the "Indian Song of Songs" it was translated in 1875 into English by Sir Edwin Arnold.

Jazerant, a jacket strengthened by small plates of metal. It was formed by overlapping pieces of steel, fastened by one edge upon canvas, which was coated over with velvet or cloth; it was, in fact, a method of quilting or padding a dress with metal internally, to make it sword and dagger proof, without being visible to the eye. The pieces of metal were generally small, and allowed flexibility by being fastened down by one side only. The jazerant was much worn by Italian nobles during the troublous period of the Middle Ages.

Jazyges (jaz-i-jēz), a Sarmatian tribe, whose original home was to the N. of the Sea of Azov. In the 1st century of the Christian era they moved W., finally set-

tling in the plains of Hungary between the Theiss and the Danube, though one band seems to have gone to the N. side of the Carpathians, and to have been vanquished by Hermanric, the King of the Goths, in the early part of the 4th century. The S. division of the tribe maintained an almost incessant warfare against the Danubian provinces of Rome, in spite of numerous defeats, especially by Marcus Aurelius (172) and Carus (283). Their power was finally broken by the Huns and Goths. The Jazyges were bold, savage horsemen, whose only abodes were wagons and tents.

Jazygia, a district in Hungary, whose inhabitants, Magyars, have no connection with the ancient Jazyges.

Jeaffreson, John Cordy (jef'ur-son), an English biographer; born in Framlingham, Suffolk, Jan. 14, 1831. He was bred to the bar, but became a novelist, changing his mind when his fiction failed and his "Novels and Novelists from Elizabeth to Victoria" succeeded; after which "A Book about Doctors," "A Book About Lawyers," and "A Book about the Clergy" spread his fame. In biography "The Real Lord Byron" and "The Real Shelley" are studies in which he shows skill. He died Feb. 2, 1901.

Jeanne d'Albrêt (zhän-dal-brā'), the Calvinistic mother of Henry IV. of France through whom he succeeded to Navarre and Bearn. She was born in 1528 and died in 1572.

Jeanne d'Arc. See JOAN OF ARC.

Jeannette Expedition, an enterprise to seek the North Pole, projected in 1879 by James Gordon Bennett, proprietor of the New York "Herald," who sent out an Arctic expedition from San Francisco in the steamer "Jeannette," under the command of Lieutenant De Long, U. S. N. The "Jeannette" was early caught in the ice-pack, drifted for nearly two years, and never escaped from its grip. Subsequently dispatches from Engineer Melville showed that after the wreck of the "Jeannette" the crew embarked in two cutters and a whaleboat. Lieutenant Danenhower and a portion of the "Jeannette's" crew reached New York at the end of May, 1882, Engineer Melville remaining in Siberia to prosecute the search for the bodies of De Long and his men. They were finally discovered in the snow, with evidences that all had perished from cold and hunger.

Jean Paul. See RICHTER.

Jebail. See BYBLOS.

Jebb, Richard Claverhouse, a Scotch classical scholar; born in Dundee, Aug. 27, 1841. He was educated at St. Columba's College, Dublin, the Charterhouse, London, and Cambridge University, and was graduated as senior classic at Trinity College in 1862. In 1869 he became public orator of that university, and in 1875 he was called to fill the Greek chair in Glasgow University, which he resigned in 1889, on being appointed Greek Professor at Cambridge. His best known works are "The Attic Orators"; "Modern Greece"; a "Life of Richard Bentley"; "Homer: an Introduction to the Iliad and Odyssey"; and an edition of Sophocles. He died Dec. 9, 1905.

Jebel er Rahmeh. See ARAFAT.

Jebel-es-Sheikh. See HERMON, MOUNT.

Jebis, or **Jebisu,** the Neptune of Japanese mythology, specially revered by fishermen.

Jebusites, one of the chief tribes of the land of Canaan; they dwelt in the mountains to the W. of the Dead Sea, and to the N. of the Hittites. Their capital was Jebus, afterward called Salem; and, according to some, was the site, at a later period, of the city of Jerusalem.

Jeconiah, King of Judah, began his reign at the age of 18, about 599 B. C. He sat on the throne, however, only a short time, being carried prisoner to Babylon by Nebuchadnezzar, when the latter took Jerusalem. He remained in captivity till the year 560 B. C., and was then placed by Evil-Merodach among the princes of his court, Zedekiah, his brother, succeeded him.

Jedburgh, the county town of Roxburghshire, Scotland, on Jed Water; 56 miles S. E. of Edinburgh. Of its magnificent Augustinian abbey, founded by David I. in 1118–1147 and finally spoiled by the English in 1544–1545, the ruined church only remains. This, Norman to Second Pointed in style, is 235 feet long, and has a central tower 86 feet high. In 1823 a jail (now disused) was built on the site of the royal castle (razed 1409), where a skeleton appeared to Alexander III. at his marriage-feast (1285). Other memories has Jedburgh — of Mary Stuart and Prince Charles Edward, of Thomson, Burns, Scott, and Wordsworth, of Mary Somerville and Sir David Brewster. A border town, it nurtured a warlike race, whose slogan, "Jeddart's here!" was seldom long silent. Their chief weapon was the "Jeddart axe," a stout steel-headed pole, four feet long; and "Jeddart's justice" is still a byword for hanging first and trying afterward. Ferniehirst Castle (rebuilt 1598; restored 1889) was the seat of the Kerrs. Jedburgh has been a royal burgh from time immemorial.

Jedwar. See ZEDOARY.

Jedda, the port of Mecca, Arabia. On June 15, 1858, the fanatic Mohammedans massacred 26 of the Christian inhabitants, among them the English and French consuls and part of their families; but many fled to the shipping. On the delay of jus-

tice, Commodore Pullen, with the "Cyclops," bombarded the town. On Aug. 6, 11 of the assassins were executed; the ringleaders afterward.

Jeddo, See TOKYO.

Jeendana. See SANDAL-WOOD ISLAND.

Jefferies, John Richard, generally known as RICHARD JEFFERIES, an English writer on rural subjects; born in Wiltshire, Nov. 6, 1848. He started life as a journalist on the staff of the "North Wilts Herald" about 1866, and won his first real success with "The Gamekeeper at Home"; its sub-title, "Sketches of Natural History and Rural Life," indicates the kind of work by which his future fame was won. Other books written in the same vein or on similar subjects are "Wild Life in a Southern County" (1879); "The Amateur Poacher" (1880); "Round about a Great Estate" (1881); "Nature near London" (1883); "Life of the Fields" (1884); "Red Deer" (1884), and "The Open Air" (1885). The book entitled "The Story of My Heart" (1883) is a strange autobiography of inner life. Jefferies possessed a wonderful insight into the habits and ways of animals and birds and creeping things, and a great love of them. He had also a reverent feeling for nature, not only of her outward phases and aspects, but also of what may be termed her inner life. He died in Goring in Sussex, Aug. 14, 1887.

Jefferson, a river in Montana, about 200 miles long. It is formed by the union of the Beaver Head and Wisdom (or Big Hole) rivers in Madison county. It unites with the Madison and Gallatin to form the Missouri.

Jefferson, Charles Edward, an American clergyman; born in Cambridge, O., Aug. 29, 1860; was graduated at Ohio Wesleyan University in 1882, and at the School of Theology, Boston University, in 1887; was superintendent of public schools in Northington, O., in 1882–1884; was ordained in the Congregational Church in 1887; and was pastor of the Central Congregational Church in Chelsea, Mass., where he served till 1898, when he became pastor of the Broadway Tabernacle, New York. He was the author of "Quiet Talks with Earnest People in My Study."

Jefferson, Joseph, an American comedian; born in Philadelphia, Pa., Feb. 20, 1829. He came of a theatrical stock, his great-grandfather having been a member of Garrick's company at Drury Lane, while his father and grandfather were well-known American actors. Jefferson was on the stage from his very infancy, appearing as Cora's child in "Pizarro" when only three years of age, and dancing as a miniature "Jim Crow" when only four. For many years he went through the hard training of a strolling actor, and then played in New York, where in 1857 he made a hit as Doctor Pangloss, and in 1858 created the part of Asa Trenchard in "Our American Cousin," Sothern playing Lord Dundreary. In 1865 he visited London, and at the Adelphi Theater played for the first time his world-famous part of Rip Van Winkle, Sept. 4, 1865. With this character his name is identified, and though he has shown himself an admirable comedian in many characters to the English-speaking world he is always Rip Van Winkle. The character is one of the most perfect works of art—beautiful in conception, delicate in execution. He died April 23, 1905.

Jefferson, Thomas, an American statesman, 3d President of the United States; born in Shadwell, Va., April 2, 1743. He received a liberal education for that time, graduating at William and Mary College in 1764. He was admitted to the bar in 1767. In 1769 he was sent to the Virginia House of Burgesses, where he gained local fame by a speech supporting the emancipation of slaves. In 1774 the Burgesses were dissolved by Lord Dunmore, the governor, but met on their own responsibility and sent delegates to the Colonial Congress. Jefferson being elected but unable to go, sent a "Summary View of the Rights of British North America," for which he was nearly attainted of treason in Parliament. Jefferson was a member of the 2d Congress, in 1775, and of the 3d, in 1776. He was appointed chairman of a special committee of five to prepare a declaration of independence. Jefferson wrote the draft, and it was adopted by the committee with very few changes, to become one of the immortal documents of history. He resigned his seat in Congress to assist in framing the Virginia constitution. In 1779 he was elected governor of Virginia. In 1783 he was returned to Congress, where he secured the adoption of the decimal system of coinage and assisted in other important measures. In 1784, with Franklin and Adams, he was instrumental in making important treaties with Prussia and Morocco. In 1785 he was made minister to France, where he served during the stormiest period of the French Revolution. The liberal and destructive spirit of that

THOMAS JEFFERSON.

revolution had great influence upon him, and his subsequent views and acts were more or less shaped by it. He floated the French tricolor at his home at Monticello, and greeted his neighbors with the title "citizen." In 1789 he was made Secretary of State by Washington. Here he was recognized as the leader of the Republican party, the other members of the Cabinet and Washington himself being Federalists. In 1794 he retired to his estate and passed three years in study and leisure. In 1797 he was chosen Vice-President with Adams, and in 1801 was elected President by the House of Representatives. In 1805 he was reëlected. His administrations were marked by the war with Tripoli, the admission of Ohio to the Union, the purchase of the Louisiana Territory, the naval episode between the "Chesapeake" and the "Leopard," the Embargo act, the trial of Aaron Burr for treason, and the prohibition of the slave trade. His course in connection with these events was warmly approved, for the most part, by the people, but much criticized by prominent Federalists, and by enemies that he made. In 1809 he retired finally to private life, where he devoted himself to study and to philanthropic enterprises, his chief undertaking being the establishment of the University of Virginia. He was steadily democratic in his views, and a champion of the rights of the States, as against centralization in government. He died in Monticello, Va., July 4, 1826, on the same day of John Adams's death, and the 50th anniversary of the famous Declaration that he had penned.

Jefferson City, a city, capital of the State of Missouri, and county-seat of Cole co.; on the Missouri river, and the Chicago and Alton, and the Missouri Pacific railroads; 125 miles W. of St. Louis. It is the farming and manufacturing trade center for Cole and adjacent counties; has manufactories of flour, shoes, farming implements, and wagons, and iron foundries. It is the seat of Jefferson City College, the general offices of the Standard Life Insurance Company, Lincoln Institute, and a female seminary. It has gas and electric light plants, a National bank, daily, weekly, and monthly periodicals, and an assessed property valuation exceeding $700,000. Pop. (1900) 9,664; (1910) 11,850.

Jeffersonia (-sō′-) (named in honor of President Jefferson), a genus of plants, order *Berberidaceæ*. The species *J. diphylla*, the twin-leaf, or rheumatism-root, is found in woods from Western New York to Wisconsin and S. The leaves, which are only two and bipartite, rise immediately from a horizontal root-stock borne on long petals, and enfolding a handsome white flower, not unlike that of the blood-root, and appearing in April and May. This plant has in the West the reputation of being a stimulant, diaphoretic, and antispasmodic.

Jeffersonville, a city and county-seat of Clark co., Ind.; on the Ohio river, and the Baltimore and Ohio Southwestern, the Pittsburg, Cincinnati, Chicago and St. Louis, and several other railroads; 50 miles S. W. of Evansville; and opposite Louisville, Ky., with which it is connected by railroad bridges. It contains the Southern State Penitentiary, High School, Public Library; is the seat of an extensive government depot of supplies; and has waterworks, gas and electric lights, street railways, large car works, 2 National banks, daily, weekly, and monthly periodicals, and an assessed property valuation of about $1,700,000. Pop. (1890) 10,666; (1900) 10,774; (1910) 10,412.

Jeffrey, Francis, a British critic and essayist; born in Edinburgh in 1773. After graduating at the universities of Glasgow and Oxford, Jeffrey, in 1794, was admitted to the Scottish bar. In 1802 he became editor of the Edinburgh "Review." The celebrity which this review at once attained was owing more in an incalculable degree to him than to any other of the contributors. In 1813 he married a grand-niece of John Wilkes, crossing to the United States to bring her home. From 1816 till he ceased to practise Jeffrey was the acknowledged leader of the Scottish bar. He died in 1850.

Jeffreys, or **Jefferies, George, Lord,** an English jurist; born in Acton, England, about 1640. By attaching himself to the Duke of York he obtained the appointment of Welsh judge, the honor of knighthood, and the chief-justiceship of Chester. In 1683 he was appointed Chief-Justice of the King's Bench, and, in 1685, Lord Chancellor. His cruelties on the Western circuit toward the deluded followers of the Duke of Monmouth were excessive; yet they gave great satisfaction to James II., who, with a grim pleasantry, called this "Jeffreys' Campaign." He died a prisoner in the Tower of London in 1689.

Jehanghir, A-Bul Muzaffer Noureddin Mohammed (jē-han-gēr′), a Mogul Emperor of Hindustan, and son of the famous Akbar, whom he succeeded on the throne of Delhi in 1605. Unlike most Eastern despots, he was generous, affable, and easy of access to his subjects, and a patron of literature and arts. He wrote memoirs of the first 17 years of his reign, and added to the historical commentaries of Sultan Baber. Nourjehan, his wife, celebrated equally for her beauty and wit, had great influence on the conduct of state affairs, and has been the fertile theme of Oriental poems and romances. He died in 1627.

Jehlam. See HYDASPES.

Jehoahaz, one of the idolatrous Kings of Israel, who succeeded his father, Jehu, in the sovereignty, 876 B. C. His iniquitous courses led to his defeat and humiliation; his country being invaded by the armies of Syria, and suffering such defeats and misfortune that he could barely muster 10,000 infantry, 50 horse, and only a few chariots to oppose the myriads of the encroaching foe. After a wicked and stormy reign of 17 years he died, 850 B. C. Also the name of a King of Judah, commonly called the younger, a son of Josiah, who, obtaining a party, usurped the throne to the exclusion of his elder brother; his short reign of a few months, however, was brought to a close by his captivity, and committal as a close prisoner to Egypt.

Jehoiakim (jē-hoi′ä-kim), a King of Judah, advanced to the throne of Judah 608 B. C. as a tributary of Pharaoh Necho, King of Egypt, to whom, as the price of his elevation, he gave 500 talents of silver and one talent of gold. Though admonished by the prophet Jeremiah to walk in the paths of virtue and piety by a strict observance of the law, like too many of his predecessors in Judah and Israel, Jehoiakim relapsed into idolatry and wickedness. His pride, or his obstinacy, brought down upon himself and unfortunate country the vengeance of the Babylonian king, Nebuchadnezzar, who with a vast army crossed the frontiers of Judea and besieged Jerusalem, rifled the temple of all its sacred and precious vessels, and leaving the humiliated king as his tributary on the throne returned to Babylon loaded with spoil, and carrying with him some of the principal inhabitants of Jerusalem as hostages of Jehoiakim's good faith, the youthful Daniel being among the captives. He died in 597 B. C.

Jehol (yā′hol), or **Ching-te-fu** (-fö), a city of inner Mongolia, containing a summer residence of the Emperor of China.

Jehoram. See JORAM.

Jehoshaphat, King of Judah, ascended the throne at the age of 35, in succession to his father, Asa, 914 B. C. During the early part of his reign his people prospered, for he was a pious prince; but having entered into an alliance with Ahab he suffered many disasters, which were at length averted by prayer and fasting; and henceforth his reign was peaceful and happy. After a reign of 25 years he died, 889 B. C., leaving his crown to his son Jehoram.

Jehoshaphat, Valley of, the valley of the judgment of God, a metaphorical name of some place where God would judge the foes of His people (Joel iii: 2, 12). There is no ground for applying it to any known locality, or for connecting it, unless for mere illustration, with the great battle of Jehoshaphat described in II Chr. xx. Since the 3d century, however, the name has been appropriated to the deep and narrow glen E. of Jerusalem, running N. and S. between the city and the Mount of Olives, called in the Bible the brook Kedron.

Jehovah, the most sacred of the names given in the Old Testament to the Supreme Being, regarded also as the God specially of the Jewish people. So holy was the name deemed that the Jews were afraid to allow it to escape their lips, and therefore took means intentionally to mispronounce it by altering its vowel points to those of Adonai, or, when the two occur together, of Elohim, less sacred names for God. This practice arose from their having misinterpreted such passages as Deut. xxviii: 58; Lev. xxiv: 11, 15, 16; Exod. xx: 7. What the real vowel points, and consequently the proper pronunciation, should be is now doubtful. Many critics contend for Hebrew, *Yahveh*, some for *Yahvah*, and some for *Yahavoh*. It is generally derived from *havah*, an old form of *haiah* = He is. The import of the name is explained in Exod. iii: 14, "I am that I am," or "I am," thus predicating self-existence or existence in a sense in which it can be applied to no created being. In Exod. vi: 3 we read that God appeared to Abraham, Isaac, and Jacob by the name of God Almighty, but was not known to them by the name Jehovah. The meaning may have been that the patriarchs did not properly realize the depth of meaning in the name, for the word occurs in Gen. xiv: 22, xxvi: 22, xxviii: 16. Elohim stands for God as the creator and ruler of the universe (Gen. i: 1); Jehovah as a being standing in the most intimate relation to the Jewish people as their theocratic ruler and God (Psalm cxxxv: 4), as supreme above all gods (verse 5), the First and the Last (Isa. xli: 4), nay the only true God (xliv: 5, 8). In studying these passages be it observed that where there is the word Jehovah our translators have spelled Lord with capital letters. It has been suggested that the name Jehovah was of Phœnician origin, and that it made way among the Israelites slowly to the age of Samuel, and then with greater rapidity. Movers connects it with the Phœnician *Iao* = the Sun-god in the several seasons, and especially in autumn, as well as with the Chaldean *Iao* = the Intelligent light.

Jehovist, one who maintained that no alteration had been made in the vowel points of Jehovah. (Opposed to the Adonists, who held that the vowel points of Jehovah are those of Adonai.) Also the writer of the Pentateuch, who habitually used the name Jehovah as distinguished from the Elohist, who employed the term Elohim. Colenso recognizes two Jehovists in the book of Genesis.

Jehu, the 10th King of Israel; had been commander in the army of Jehoram, his king, whom he shot with an arrow, and put to death 70 of Ahab's children, and the priests of Baal in the temple of their idol. Afterward relapsing into idolatry, he was punished by the delivery of his kingdom to Hazael, King of Syria. He died in 857 B. C.

Jejeebhoy, Sir Jamsetjee, a Parsee merchant prince and philanthropist; born of poor parents in Bombay, India, July 15, 1783. He contributed very generously to various educational and philanthropic institutions in Bombay. Altogether, between 1822 and 1858 he spent upward of £250,000 in undertakings of a purely benevolent character. In 1857 he was made a baronet. He died April 14, 1859.

Jejunum (jē-jūn'um), the second portion of the small intestine between the duodenum and the ileum. It is thicker than the rest of the intestine, and, from containing more mucous membrane, has a pinky tinge. It forms two-fifths of the small intestine, and is surrounded above and at the sides by the colon, and is kept in position by the mesentery, which connects it with the posterior wall of the abdomen.

Jelalabad (jel-a-lä-bäd'), or **Jalalabad** (jäl-), a town of Afghanistan; 78 miles E. N. E. of Kabul, on the Peshawar route. A famous and successful resistance was made here in 1841–1842 by the British forces under Sir Robert Sale. Also the capital of Seistan, Southwest Afghanistan. Pop., est., 10,000. There are several towns of this name in British India.

Jelf, William Edward, a Greek grammarian; son of Sir James Jelf; born in Gloucester in 1811. He was educated at Eton and Christ Church, Oxford, and was successively tutor and censor of his college, public examiner and proctor of the university. He was one of the preachers at the Chapel Royal, Whitehall, 1846–1848, and gave the Bampton Lectures in 1857 on "Christian Faith." In 1861 he published a letter to Dr. Temple on the "Supremacy of Scripture" in answer to his famous essay on "The Education of the World." He is best remembered as the author of a "Greek Grammar," based on that of Kühner (1842–1845; 4th ed. 1866), still the most complete in English. His "Examination Into the Doctrine of Confession" appeared in 1875; his "Ritualism, Romanism, and the English Reformation" in 1876. He died Oct. 18, 1875.

Jellachich, Baron Joseph (yel'a*h*-i*h*), an Austrian general and Ban of Croatia; born in Peterwardein, Oct. 16, 1801. Having won the entire confidence of the Croatians, he was in 1848 appointed Ban of Croatia; by this appointment Austria secured the support of the Slavonian Croatians against the Magyars of Hungary. Jellachich took an active part in the suppression of the Hungarian rising. He died in Agram, May 20, 1859.

Jelly, the term applied to every translucent juice which, when cold, thickens so as to coagulate into a trembling mass; thus the juices of acid or mucilaginous fruits, currants, etc., are called jellies when, by the addition of one part of sugar to two parts of juice, and by boiling, they have obtained a proper consistence. The term is also applied to a concentrated decoction of Iceland moss, rendered agreeable to the taste by the addition of sugar, etc. When the horns, bones, or extremities of animals are boiled to such a degree as to be stiff and firm when cold, without the addition of any sugar, they are also called jellies. Fruit jellies, when diluted with water, are good as medicines; in their nature they are cooling, saponaceous, and ascescent. Jellies made from animal substances, on the contrary, are alkalescent, and are therefore good in all cases in which acidity of the humors prevails. Animal jelly is soluble in water, glutinous, becomes fluid by heat, coagulates in the cold, and combines with oils and resins.

Jelly Fish, a name for bell-shaped or disk-like marine *Hydrozoa*, for the most part active swimmers. One set, known as *Acraspeda* or *Acalephæ*, are usually large, with a climax in a giant specimen of *Cyanea*, which had a bell 7½ feet across, and tentacles 120 feet long. Beset with myriads of stinging cells, these "blubbers" often make bathers more than uncomfortable. They are frequently left stranded in great numbers on the beach by the retiring tide. The common *Aurelia* is a well-known representative, while the exceptional *Lucernarians* are noteworthy in leading a more or less sedentary life attached to seaweeds and other objects. Anatomically different from the above, and included among the craspedote *hydrozoa*, are the *Trachymedusæ*, of which *Geryonia* is a good type. Finally, a great number of medusoid forms, usually small in size, very closely resemble the *Trachymedusæ*, but differ both from them and from the *Acraspeda* in being the liberated sexual "persons" of hydroid or zoöphyte colonies.

Jemappes (zhuh-mäp'), a village in the Belgian province of Hainault. Here the French Republicans under Dumouriez, on Nov. 6, 1792, defeated the Austrians, which victory placed Belgium in the power of the French. The village stands on one of the richest coalfields of Belgium, and manufactures stoneware, glass, and chemicals. Pop. (1900) est. 12,500.

Jemez, Emmes, or **Hemes,** a division of the Sañoan linguistic stock of North

American Indians, who live in the pueblo of Jemez, on the river of that name, 20 miles N. W. of Bernalillo, N. M. They number a few hundred.

Jena (yā′na), a town of Germany, in the grand-duchy of Saxe-Weimar; 12 miles E. of Weimar, on the Saale, a place of little importance except for its university, which was opened in 1558. It has in all 97 professors or lecturers, an anatomical theater, botanical garden, zoölogical museum and other scientific collections, observatory, library of 200,000 volumes, and over 700 students. On Oct. 14, 1806, the Prussians (70,000 men) under Prince Hohenlohe were defeated here by the French under Napoleon (90,000 men). Pop. (1905) 26,-355.

Jenckes, Joseph, an American inventor; born in Colbrooke, England, in 1602; became a master mechanic; established the first iron works in the American colonies in 1642; directed the erection of the first furnaces, the manufacture of the first molds and the casting of the first tools and machinery; designed an improved water-wheel in 1646, and later a sawmill. In 1652 the first mint was founded in Boston, and Jenckes cut the first dies for its coins; made the first fire engine in America in 1654; invented also an improved grass-scythe which has been used in all countries with but few changes. He died in Lynn, Mass., March 16, 1683.

Jenghiz Khan. See GENGHIS KHAN.

Jenkin, Henrietta Camilla, an English novelist; born in Jamaica about 1807. Well educated and clever, she wrote fiction as a means of livelihood. Her "Cousin Stella" (1859), a portrayal of West Indian life and manners, made a hit; as did "Who Breaks, Pays" (1861), in which the flirt is admirably pictured. She died in Edinburgh, Feb. 8, 1885.

Jenkins, Edward, an English political pamphleteer; born in Bangalore, India, in 1838; was educated at McGill University, Canada, and the University of Pennsylvania. A member of Parliament, he wrote on social and political questions in the satirical vein; his "Ginx's Baby" (1870); "Lord Bantam," "Litttle Hodge," and other efforts, have had great currency.

Jenkins, John Stilwell, an American prose-writer; born in Albany, N. Y., Feb. 15, 1818. He was a lawyer by profession, but edited the Cayuga "Times." Among his works are: "Generals of the Last War With Great Britain" (1841); an abridgement of Hammond's "Political History of New York" (1846); "Alice Howard" (1846); "Life of Silas Wright" (1847); "History of the Mexican War" (1848); "Heroines of History" (1853); etc. He died in Weedsport, N. Y., Sept. 20, 1852.

Jenkinson, Anthony, an English explorer. He traveled extensively, beginning his journeyings in the Levant in 1546. He was the first Englishman to penetrate Central Asia. He died in Tighe, Rutland, in February, 1611.

Jenne (jen′ne), a town of Central Africa, on the Niger, and on the road from Sego to Timbuctoo, from which it is distant about 280 miles. It is a place of considerable commercial importance, and in the shops may be seen printed muslins, scarlet cloth, hardware goods, and other articles of British manufacture. Pop. about 9,000, all Mohammedans, who allow no "infidels" to enter the town.

Jenner, Edward, an English physician; born in Berkeley, Gloucestershire, in 1749. After many years devoted to the consideration of, and experiments made with, vaccine lymph (or fluid taken from a pustule on the teat of a cow, and to the efficacy of which he had very early in life been directed) as a specific for smallpox, Jenner was for the first time, in 1796, enabled to satisfy many medical men of the valid properties of this new agent, and show by a demonstration that the lymph or fluid humor taken from a cow, when inserted under the skin of a patient of any age, acted as a prophylactic, or preventive of the disease known as smallpox; such lymph, after a period of seven to nine days producing on the human subject a disease precisely similar to that in the cow from whence it was taken, and possessed the same integrity and preventitve qualities, for the use of others, with that obtained from the pock on the cow's teat. He died in 1823.

Jenner, Sir William, an English physician; born in Chatham in 1815; was educated at University College, London, where he himself was professor (latterly of Practice of Medicine) from 1848 till 1879. He was appointed physician in ordinary to the queen in 1862, and to the Prince of Wales in 1863; was made a baronet (1868), K. C. B. (1872), G. C. B. (1893), F. R. S., president of the College of Physicians, etc. It was he who established the difference between typhus and typhoid fevers (1851). He died Dec. 11, 1898.

Jenolan Caves, a series of vast limestone caverns, on the W. side of the Blue Mountains, in New South Wales, Australia. They were discovered in 1841, and were set apart in 1866 as public property. In grandeur, magnitude, and rich variety they rival the Mammoth Cave of Kentucky.

Jensen, Wilhelm (yen′sen), a German author; born in Heiligenhafen, Holstein,

Feb. 15, 1837. He was antithetic and realistic in method. Of his poetry the "Songs From France" and "A Dream in a Glade" must win a permanent place. The tragedy "Dido" is meritorious. Of the novels, "Eddystone," "Under Warmer Skies," "Nameless," and "After Sunset," achieved wide popularity. Impatience and rapidity of production tend to mar his style.

Jephthah (jef'tha), one of the judges of Israel, who made a remarkable vow before he marched against the Ammonites, that if he proved victorious he would offer to the Lord the first living thing which should come to meet him on his return. This happened to be his only daughter, whom he is said to have sacrificed to fulfil his rash vow. But many learned writers contend that the text does not warrant the assertion, that the daughter of Jephthah, instead of being sacrificed, was devoted to perpetual virginity.

Jerábek, Frantisek (yer'shä-bek), a Czech poet; born in Sabotka, Jan. 25, 1836. "Hána" was his first dramatic effort; but "The Way of Public Opinion" and "A Servant of His Lord" are deemed the triumphs of his genius. In the historic tragedies of "The Son of Man" and "Závist" he obtains the most vivid dramatic effects. Few play-writers of recent times have equaled him in sensational climax and in dignity of diction and movement. He died in Prague, March 30, 1893.

Jerba. See SERBI.

Jerboa (jer-bō'ä), a rodent mammal, with a body six inches long and a tail about eight, occurring in Egypt, Nubia, Arabia, and some other parts of Western Asia. They are lively little creatures, forming societies in the desert, feeding on its scanty vegetation, and living in underground galleries. When the jerboa desires to advance rapidly it does so by a series of leaps, which make it seem like a winged thing. The tail in leaping is extended in a straight line behind the body; but in sitting or when at rest it is curved in the shape of the letter S, the lower curve of the tail touching the ground. The Arabs, in trapping the jerboas, the flesh of which they esteem a delicacy, take care to stop up the entrance or outlets of the different nests of the colony except one, through which the community is attacked and in this manner its members are secured alive.

Jeremiah, the name of eight men mentioned in the Old Testament, the only very notable one being Jeremiah the prophet. He was of priestly descent, and born or resident of Anathoth, about 3 miles from Jerusalem. His father's name was Hilkiah. When called to the prophetic office, in the 13th year of King Josiah, B. C. 629 or 625, he calls himself a child. His prophetic life spanned the 11th of King Zedekiah, about B. C. 588, a period of 37 or 41 years. Of intense nervous sensibility, gentle, and compassionate, he seemed more naturally adapted for retirement and contemplation than for an active life, yet under the constraining sense of duty he faced hostile kings, nobles, or common people, suffered imprisonment more than once, and was at times in imminent danger of death. At that time Judah found itself between two powerful kingdoms, Babylon on the E. and Egypt on the S. Josiah espoused the Babylonian alliance, and lost his life fighting against the Egyptians. Jeremiah also was on the Babylonian side, and, when Jerusalem was taken by Nebuchadnezzar, Jeremiah was treated with kindness by the conqueror, be-

JEREMIAH BY RAPHAEL.

ing offered the option of an honorable position in Babylon or permission to remain in his own land. Jeremiah elected to stay, and found Gedaliah appointed ruler by the Chaldeans. On the murder of that governor the assassins and their sympathizers fled to Egypt, taking Jeremiah with them. Tradition says that he was put to death in Egypt for preaching against idolatry. He wrote two Old Testament books, the prophecies of Jeremiah and the Lamentations. Many rationalistic critics attribute to him also the book of Deuteronomy.

The Prophecies of Jeremiah.— One of the canonical books of the Old Testament, the second of the greater prophets. The several predictions are not in chronological order, though it is believed by some critics that

an arrangement of another character is discernible. A certain plaintive air runs through the book, deepening as the trials of the seer increase. There is not the same energy or rhythm as in Isaiah. There are resemblances in the language to that of Deuteronomy —Aramaic expressions abound in the work. The concluding chapter, an historical one, is evidently from another hand — the Hebrew and Septuagint differ considerably. Jeremiah xxxi: 15 is quoted in the New Testament in Matt. ii: 18, and Jer. xxxi: 31-34, in Heb. viii: 8–12. The quotation from Jeremy the prophet in Matt. xxvii: 9 is now found only in Zech. xi: 12, 13.

Jeremija Halpa. See KOSTOMAROV.

Jerfalcon. See GERFALCON.

Jericho, a city of the Canaanites, in a plain on the W. side of the Jordan, near its mouth. It was destroyed by Joshua, rebuilt in the time of the judges, and formed an independent frontier fortress of Judæa. It was again destroyed by Vespasian, rebuilt under Hadrian, and finally destroyed during the crusades. The site of Jericho has usually been fixed at Rihah, a mean and foul Arab hamlet of some 200 inhabitants. Recent travelers, however, show that the probable location of Jericho was 2 miles W. of Rihah, at the mouth of Wady Kelt, and where the road from Jerusalem debouches into the plain. On the W. and N. of Jericho rise high limestone hills, one of which, the dreary Quarantana, 1,200 or 1,500 feet high, derives its name from the modern tradition that it was the scene of our Lord's 40 days' fast and temptation. Important discoveries have recently been made on the site of the city.

Jericho, Rose of, popular name of *Anastatica hierochuntina,* a genus of plants belonging to the order *Brassicaceæ,* or crucifers. It is an annual, inhabiting the Egyptian desert. It is so highly hygrometric that when fully developed it contracts its rigid branches so as to constitute a ball. Exposed then to the action of the wind, it is driven hither and thither. If, however, it be brought in contact with water, the ball-form vanishes, and the branches again acquire their natural expansion. Superstitious tales about this so-called rose are afloat in the East. It is said to have first bloomed on Christmas eve, and continued in flower till Easter; at its birth heralding the advent of the Redeemer, and immediately before its departure honoring His resurrection. Plants of this kind are sold in the florists' stores in America about Easter time. They appear to be dead, but placed in water they revive. They are sold as "resurrection plants."

Jerked Beef, beef cut into strips of about an inch thick, and dried in the sun to preserve it. It is used in Chile and other parts of South America, and has been tried in Australia. When well prepared it will keep for a great length of time.

Jerkin Head, in architecture, the end of a roof when it is formed into a shape intermediate between a gable and a hip, the gable rising about half way to the ridge, so as to have a truncated shape, and the roof being hipped or inclined backward from this level.

Jeroboam, the 1st King of Israel, an officer in the service of Solomon, who had created him governor of the States of Ephraim and Manasseh. While fulfilling these offices it was predicted that he should yet rule over 10 instead of 2 of the tribes. Solomon, alarmed at the effect of such a report, sent out his officers to secure Jeroboam; but he, receiving timely warning, left his post and fled into Egypt, where, for the rest of Solomon's reign, he remained in retirement. On the death of that monarch, 990 B. C., and the revolt of the 10 tribes from the house of Judah, Jeroboam returned to his native land; and the revolted tribes having formed themselves into a separate kingdom, under the name of Israel, elected Jeroboam as their first king, and who, after an unholy and idolatrous reign of 22 years, died 968 B. C.

Jeroboam II., King of Israel, and the son of Joash, succeeded that king in 834 B. C. After some signal victories over the Assyrians he fell into the practice of idolatry and had his kingdom overrun by the Assyrians. The prophets Hosea and Amos predicted the downfall of his house.

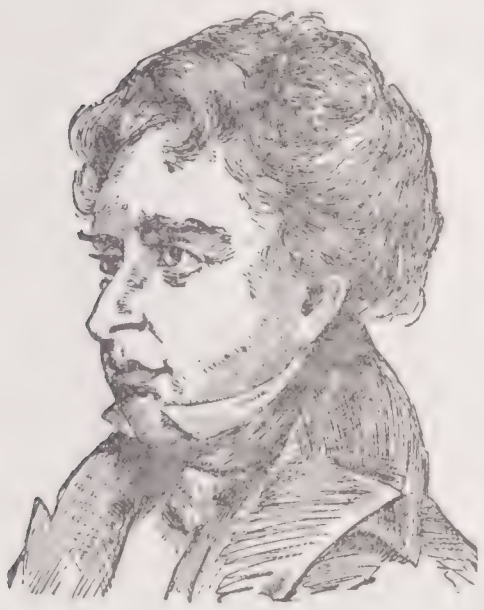
Jerome, Jerome Klapka, an English author; born in Walsall, May 2, 1861. He wrote: "On the Stage — and Off" (1885), largely autobiographical; "Idle Thoughts of an Idle Fellow"; and a comedy, "Barbara." "Three Men in a Boat" (1889) was the success of its year; after which time his works as dramatist, journalist, and story-teller were many.

Jerome, or **Hieronymus,** one of the fathers of the Church; born in 331 at Stridon, on the frontiers of Dacia. He was ordained a presbyter at Antioch in 378, and soon after went to Constantinople, where he lived with Gregory Nazianzen. In 382 he visited Rome and was made secretary to Pope Damasus; but three years afterward he returned into the East, accompanied by several female devotees who wished to lead an ascetic life in the Holy Land. His writings are very numerous, the most important being his Commentaries on various parts of the Bible. The Church owes to him the Latin translation of the Bible, well known under the name of the Vulgate.

His style is singularly pure and classical. He died in 420.

Jerome of Prague, a Bohemian reformer; born about 1360. He was in faith and sufferings the companion of the famous John Huss. Together they made a vigorous crusade against the dissoluteness of the clergy, the worship of relics, etc. When Huss was imprisoned in Constance Jerome hastened to his defense, but was seized and carried thither in chains (1415). After much suffering he consented to recant his heresies, but on being subjected to a new examination solemnly retracted his recantation and made a vigorous vindication of the principles of Huss and Wycklif. On May 30, 1416, he was burned at the stake, and his ashes thrown into the Rhine.

Jerrold, Douglas, an English humorist and dramatist; born in 1803. After being for a short time a midshipman, he was bound as an apprentice to a printer in London. His first play, "More Frightened Than Hurt" (1818), was not at first successful, but his "Black-eyed Susan" (1822) ran for 300 successive nights at the Surrey Theater. Jerrold's subsequent dramas were "Rent-day," "Nell Gwynne," "Housekeeper," the "Prisoner of War," "Bubbles of a Day," "Time Works Wonders," "St. Cupid," "Catspaw," "Heart of Gold," and several others. He contributed extensively to periodical literature, founding and conducting successively the "Illuminated Magazine," and Douglas Jerrold's "Shilling Magazine," and latterly editing "Lloyd's Weekly Newspaper." To "Punch" he contributed his inimitable "Mrs. Caudle's Curtain Lectures," "Punch's Letters to His Son," etc. He died in 1857.



DOUGLAS JERROLD.

Jerrold, William Blanchard, an English journalist and topical writer, son of Douglas; born in London, Dec. 23, 1826. He edited Lloyd's newspaper brilliantly, and became half a Frenchman in residence, speech, and manner, his best writings being contained in: "Paris for the English" (3d ed. 1868); "The Cockaynes in Paris" (1871); and "The Best of All Good Company" (1871), a series of recollections of Dickens, Bulwer, and others; but he wrote a good comedy occasionally, and some readable stories, and also a "Life of Napoleon III" (1875-1877). He died March 10, 1884.

Jersey, the largest and most important of the Channel Islands, lying in the English Channel, and belonging to Great Britain. It is about 12 miles long and 7 miles wide.

Jersey City, a city and county-seat of Hudson co., N. J., on the Hudson river, the Morris canal, and the Pennsylvania, the Erie, the Lehigh Valley, the New Jersey Central, the Baltimore and Ohio, the West Shore, the New Jersey and New York, the New York, Susquehanna and Western, and the Lackawanna railroads; opposite New York city, with which it is connected by steam ferries; area 13 square miles.

Public Interests.—The business portion of the city lies in a level stretch along the river, about a mile in width. W. of this is an abrupt bluff on which is the residential portion of the city. Jersey City is the second largest city in the State; is lighted by electricity at a cost of $140,000 annually; owns a waterworks system with a capacity of 130,000,000 gallons; and has trolley connections with Newark, Elizabeth, Hoboken, and other nearby cities. There is a public library, the Hasbrouck Institute, German American School, St. Aloysius Academy, St. Peter's Roman Catholic College, Christ's and St. Peter's Hospitals, and a public high school. In 1901 there were 200 miles of streets, of which 101 miles were paved, 104 miles of sewers, and 209 miles of water mains. The assessed property valuation was $93,325,000, the total public debt, excluding water debt, $15,027,120; total resources, $14,665,783, and sinking funds, $3,028,934.

Business Interests.—The business interests of Jersey City are closely allied with those of New York city. Being the terminus of several large railroads and steamship lines, the commercial trade is very extensive. It has extensive stock yards, slaughter houses, grain elevators, and meat packing establishments. Its manufactures are varied and extensive, and include iron and steel goods, machinery, locomotives, boilers, fireworks, furnaces, lead pencils, crucibles, silk, windmills, watches and jewelry, paints and chemicals, tobacco, zinc goods, sugar, bridges, oakum, glass, soap, candles, pottery, and foundry products. In 1901 there were 4 National banks, with $1,100,000 capital, and $1,150,000 surplus, and several private banks, savings institutions, and trust and loan companies.

History.—Jersey City was formerly known as Paulus Hook; was laid out in 1804; chartered as the city of Jersey in

Jerusalem

1820; incorporated as Jersey City in 1838; enlarged by annexation of Hudson and Bergen in 1870, and by Greenville in 1872; and was rechartered in 1889. Pop. (1900) 206,433; (1910) 267,779.

Jerusalem (Arabic, El-Kuds), a city of Palestine, of little account and wretched appearance at the present time, but of transcendent historical importance, especially in connection with the religious evolution of mankind; situated on the S. end of a plateau between the Judæan watershed ridge (on the W.) and the ridge of Olivet (on the E.); 32 miles from the coast of the Mediterranean, 14 miles W. of the N. end of the Dead Sea, and 126 miles S. S. W. of Damascus. The plateau is penetrated by two deep waterless valleys running roughly N. and S. The E. one, called the Valley of Kidron, extends along the W. base of Olivet for about a mile and a half, terminating S. at a well, known as Bir Eyyub; and the W. or Wadi er-Rababi, runs S. for about half a mile from near the main watershed, and then turns E. to join the Kidron valley. The part of the plateau inclosed between these two valleys is divided into an E. and a W. ridge by a broader and shallower valley running roughly parallel to the former two, and known as the Tyropœon. The Valley of Hinnom must have been one of these three, most probably the Tyropœon. A sort of branch near the head of the Tyropœon divides the W. ridge into two summits, a N. and a S., connected by a narrow saddle; but the E. ridge is undivided, except by a trench cut in the rock at its narrower central part. The N. part of the plateau was known as Bezetha, or "place of olives." The heights above sea-level of the chief summits of the site are: N. summit of E. ridge, 2,440 feet descending S.; N. summit of W. ridge, 2,490 feet; S. summit of W. ridge, 2,520 feet. There is no doubt that the temple stood on the N. E. hill, in the inclosure known as Haram-esh-Sherif, but a difference of opinion still prevails regarding the site of Zion or the City of David. Tradition following Josephus places it on the S. W. summit, and this view is still held by such an eminent authority as Conder; but most recent authorities support the view first advanced by Birch in 1878 that the City of David was built on the E. ridge to the S. of the Temple hill. The rectangular S. W. summit was the site of what Josephus calls the Upper City.

The present city wall, with 34 towers, incloses the Temple hill, Bezetha, the N. W. summit and the N. part of the S. W. hill, but excludes the true Zion hill, or that on which the City of David stood. It is very irregularly quadrangular and is pierced by eight gates, of which one has been walled up. In the S. portion, which runs from the E. side of the Wadi er-Rababi in a generally E. N. E. direction across the upper part of the Tyropœon to the S. boundary of the Haram-esh-Sherif, there are the gates Bab en-Nebi Daud, or Gate of Zion, and Bab el-Magharibeh, or Dung Gate. The E. wall proceeds N. with a slight W. tendency in a practically straight line along the W. side of the Kidron valley, and forms the E. boundary of Haram-esh-Sherif and Bezetha. In it are the gates Bab el-Daheriyeh, or Golden Gate, closed up, and Bab Sitti Maryam, or St. Stephen's gate. The W. wall, after running S. to N., makes an abrupt change of direction to the N. W. at the Phasaël tower (now El-Kala'a, The Citadel). Its only gate is the Bab el-Khalil, or Jaffa gate. The direction of the N. wall is roughly, W. S. W.–E. N. E., and in it are the gates Bab Abdul Hamid, or New gate, opened in 1889, Bel el-Amud, or Damascus gate, and Bab es-Sahireh, or Herod's gate.

Remains of various ancient walls have been excavated and the course of most of the early walls may be now regarded as settled. The first wall, that of David and Solomon, extended almost due W. from the Temple inclosure to the Tower of Hippicus, at the N. W. angle of the Upper City, thence down the W. scarp of the S. W. hill to the English School and Cemetery, outside the present city, then E. past the Jewish Cemetery and across the mouth of the Tyropœon to Siloam, and finally N. along the E. of the Ophel quarter (City of David) to the S. E. angle of the Temple inclosure. The second wall inclosing the new town or trading city extended from about the N. W. angle of the first E. in an irregular line to the Antonia or Baris tower at the N. W. corner of the Temple inclosure, in such a way as to exclude from the city the present Church of the Holy Sepulcher. The third wall, erected by Agrippa I. to include the N. suburbs, probably coincided with the present N. town wall, but some place it much farther N. Remains of other walls have been found to the S. W. and S. E. of the city. The water supply of Jerusalem is obtained mainly from rain tanks, but the town was once partially supplied from the Virgin's Spring, on the E. side of the S. E. hill. An ancient aqueduct connects this spring with the Pool of Siloam (now Birket Silwan), at the S. end of the ancient Zion. The Hammam esh-Shefa is an underground cave well W. of the Temple hill. The chief pools or reservoirs are the Birket es-Sultan, just outside the S. W. angle of the modern city; the Mamilla Pool, farther up the Wadi er-Rababi; the Amygdalon, or Patriarch's Pool, within the city, near the W. wall; the Twin Pools, just N. of the Temple hill; the Birket Isra'in, just outside the N. E. angle of the Haram; and the Birket Sitti Maryam, outside the city on the E. The best known names in connection with

Jerusalem

the exploration of the site of Jerusalem are those of Bonomi, Catherwood, Arundale (1833), Robinson (1838 and 1852), Aldrich and Symonds (1849), De Vogüé (1860–1863), Sir Charles Wilson (1866), Sir Charles Warren (1867–1870), Colonel Conder (1872–1875), Maudslay (1874), Guthe (1882), Schick (1883), Bliss and Dickie (1894–1897).

Modern Jerusalem is a rather dirty town, with crooked and badly paved streets, most of them very narrow. The city is divided by the main street running from the Damascus gate S. to near the Zion gate, and that running E. from the Jaffa gate to the Haram into four quarters. The N. E. quarter is inhabited by Mohammedans, and the S. E. by Jews, while the two W. quarters are occupied by Armenians (S.) and other Christians (N.) respectively. The numbers of the different communities have been returned as follows: Jews, 41,000; Mohammedans, 7,000; Christians, 12,800, comprising 6,000 Orthodox Greeks, 4,000 Roman Catholics, 1,400 Protestants, 800 Armenians, 200 United Greeks, and smaller numbers of Copts, Syrians, etc.; thus giving a total population of fully 60,000. An Orthodox Greek, an Armenian, and a Latin patriarch reside in Jerusalem, and the smaller Eastern churches have resident bishops. Till 1887 a joint Protestant bishopric was supported by England and Prussia, but the English and German Churches are now separately governed. The city is now governed as an independent sanjak by a mutessarif of the first class, immediately subject to the Turkish government at Constantinople. There is an executive council and a town council, on both of which the chief religious groups are represented.

By far the most interesting part of Jerusalem proper is the Haram esh-Sherif, the site of the celebrated temple and palace of Solomon and of the later temples. Some remains of Herod's temple are still to be seen. The Haram is roughly rectangular, about 527 yards by 330, and on the W. and N. sides, where there are some houses, several gates communicate with the rest of the city. Near the center of this area is an elevated platform approached by flights of steps on all sides, and on it stands the beautiful octagonal Kubbet es-Sakhra, or Dome of the Rock. Each side of the octagon is 66 feet 7 inches long, and is adorned on the outside with marble and porcelain tiles, and in each of the four sides which face the cardinal points is a square gate surmounted by a vaulted arch. The dome is supported on a circle of supports in the interior, consisting of four massive piers facing the middle points of the N. E., N. W., S. E., and S. W. faces of the octagon and of 12 columns; and between this circle and the outer walls there is an octagonal series of supports, comprising 8 corner piers and 16 columns. The dome itself is of wood, and beneath it is the Sacred Rock about which so many legends have gathered. Immediately E. of the Kubbet es-Sakhra is the Kubbet es-Silseleh, or Chain Dome, which is also known as David's Place of Judgment. Other objects of interest on the raised platform are the Kubbet el-Miraj (Dome of the Ascension), commemorating Mohammed's miraculous ascension to heaven; the Kubbet en-Nebi (Dome of the Prophet), covering an underground mosque; the Kubbet el-Arwah (Dome of the Spirits); and the Kubbet el-Khidr (St. George's Dome). Next to the Dome of the Rock the most notable structure in the Haram is the mosque called El-Aksa at the S. end. It is a basilica, with nave and triple aisles (with subsidiary buildings), the principal axis of which forms a right angle with the S. wall of the Temple precincts. Not reckoning the annexes, it is 88 yards long and 60 yards wide. Other objects worthy of mention within the Haram precincts are: the beautiful fountain Sebil Kait Bei, dating from the 15th century; the fine pulpit of Kadi Borhaneddin, also of the 15th century; the Throne of Solomon, a modern mosque; and the fortress of Antonia or Baris, at the N. W. angle, now used as barracks.

Outside the limits of the Haram the most noteworthy building is the Church of the Holy Sepulcher in the Christian quarter which was erected in its original form as early as the 4th century, but the greater part of the present structure dates only from the beginning of the 19th century. The main part of the church is the rotunda, with a dome 65 feet in diameter (restored 1868), resting on 18 piers, and beneath the latter is the small Chapel of the Sepulcher. Immediately E. of the Rotunda is the Catholicon, or Church of the Crusaders, erected in 1140–1149, and originally a separate building. The church buildings are said to include, to the S. E. of the Rotunda, the hill of Golgotha or Calvary, and at every step we are met with more or less doubtful identifications of spots associated with the life of Jesus. The 22 chapels associated with the central parts of the church are all more or less interesting. The other edifices, institutions, or places of note within the city walls may be briefly enumerated: the German Protestant Church of the Redeemer (1898) in the Christian quarter on the site of an ancient church of Maria Latina; the Church of St. Anne, N. of the Haram, belonging to a French mission; the English Church, in the S. W. quarter; the Church of St. James (Armenian), beside the latter; various monasteries, mosques, and synagogues; the Via Dolorosa, along which Jesus is said to have carried the cross to Calvary, following the present street, Tarik Bab Sitti Maryam, from St.

Stephen's gate, and other streets, and marked by many traditional sites; several hospices and hospitals; the Old, the New, and several other Bazars; the three Patriarchates; the Castle of Goliath at the N. W. angle of the walls; the Citadel; the Serai, or pasha's residence; the Old Serai, now used as a State prison; the Mehkemeh, or House of Judgment, a 15th century arcade, close to the W. of the Haram; the Wailing Place of the Jews, a wall near the Mehkemeh; the cavalry barracks; etc. Situated outside the present walls of the city are: the Jaffa suburb on the W., containing the Mamilla Pool, Turkish postoffice, etc.; French and Russian buildings to the N. W.; the Mount of Olives, with Russian buildings, Carmelite monastery, Churches of Gethsemane, Tombs of the Prophets, etc., to the E.; the Zion suburb on the S. W., with an English school, the Cœnaculum, or Chamber of the Last Supper, English, Armenian, Latin, and Greek cemeteries, the railway station on the railway line from Jaffa, the Tomb of David, etc. The foreign consular buildings are mostly without the city proper.

The earliest historical mention of Jerusalem is in the Tell el-Amarna tablets (about 1400 B. C.). It was then subject to Egypt. Later we find it in the hands of a people called Jebusites, from whom it was captured by David (II Sam. v: 6–10). Under him it rose rapidly in importance and received numerous embellishments; but these were all eclipsed by the more magnificent structures of Solomon, whose crowning work was the erection of the great temple. The rash proceedings of his successor, Rehoboam, and the consequent revolt of 10 tribes must have shorn Jerusalem of much of its glory; but it still continued for several centuries to take precedence as one of the most distinguished cities of the East. At length, having awakened the jealousy or excited the avarice of neighboring potentates, it was attacked in succession by the Egyptians, Assyrians, and Babylonians. The last were headed by Nebuchadnezzar, who, 588 B. C., having made himself master of the city, destroyed it, burned down the temple after rifling it of its treasures and carried off those of the inhabitants whom the sword had spared as captives to Babylon. After 70 years of captivity, Cyrus permitted the Jews to return; and the temple, though on a scale of much less magnificence than before, was rebuilt 515 B. C. Jerusalem now enjoyed a period of repose and had regained a considerable degree of prosperity, when, on the dissolution of the Macedonian empire which Alexander had established, it was seized and sacked by Ptolemy Soter, who carried off a great number of the inhabitants to Alexandria. By the victorious achievements of the Maccabees, the Macedonian yoke was thrown off, and Jerusalem in common with Judea, became once more independent, 165 B. C. It next became tributary to Rome; but continuing to be governed by its own sovereigns had not ceased to exist as the capital of a kingdom when the Saviour appeared. About 40 years after His death the tyranny of the Romans drove a section of the Jews into revolt, and in A. D. 66 Jerusalem was taken by the insurgents. Titus, the son of the Emperor Vespasian, regained it in the year 70, after one of the most terrible sieges recorded in history; the temple was burned and the city razed to the ground. In 131 Hadrian ordered the city to be rebuilt. The Jews, apprehending that pagan idols would be set up in the holy places, broke into rebellion and took Jerusalem, which the Romans recaptured only after a protracted and sanguinary contest. They then finished the building of the city, and, calling it Ælia Capitolina, made it a Roman colony and forbade the Jews to approach it on pain of death.

It continued thus depressed till the beginning of the 4th century, when Rome having become Christian, Jerusalem shared in the benefit and assumed the appearance of a distinguished Christian city, under the fostering care of Helena, mother of Constantine the Great. This period of prosperity, prolonged by a succession of Christian emperors, was suddenly terminated in 636 by the conquest of the Mohammedans, under the Arabian Caliph Omar, whose dynasty was afterward succeeded by that of the Turks. The indignities and cruelties heaped on the Christians and the utter desecration of their most holy places roused the indignation of Europe, and led to the Crusades. In 1099 the Crusaders took Jerusalem by storm and made it the capital of a Christian monarchy which with difficulty maintained its existence till 1187, when it was finally overthrown by the celebrated Sultan Saladin. The population of the ancient city at the time of its greatest prosperity has been variously estimated. The assertions of Josephus that 3,000,000 would be collected in it at the passover, and that 1,000,000 perished during the siege of Titus, are manifestly absurd. The computation of Tacitus is 600,000, a figure which is also far beyond the limits of probability. Taking the area of the city at 2,250,000 yards, and allowing 50 to each inhabitant, the result is 45,000, an extreme estimate for a city containing palaces and public buildings; 30,000 may be set down as the likeliest estimate.

Jesids (jes'ids) ("Devil Worshipers"), a sect in Russian and Turkish Armenia, the valley of the Tigris, etc. Their holy city is Ba-Hasani. It is said their name is compounded of Jesu (their founder) and Jesid, a town. They pray to the rising sun, worship Allah, reverence Mahomet, and deem Christ a great angel ("the son of

light"). Their chief concern is to conciliate Shaitan, the devil, whose name they never utter. Thursday is their Sabbath, and they fast 40 days in the spring of the year. Their children are baptized, and their ecclesiastical orders consist of sheikhs, fakirs, and djirs (elders). They abhor the color blue, show the greatest respect to women, widows dress in white, and the dead are buried with their faces turned to the pole star.

Jesse, in Scripture, the son of Obed and father of David. He was a grandson of Ruth, the Moabitess, and in her native land he found an asylum while David was in most danger from the jealous pursuit of Saul.

Jessup, Henry Harris, an American missionary; born in Montrose, Pa., April 19, 1832; graduated at Yale College in 1851, and at the Union Theological Seminary in 1855; ordained in the Presbyterian Church; was a missionary in Tripoli, Syria, in 1856–1860, and then in Beirut; works: "Mohammedan Missionary Problem"; "The Woman of the Arabs"; "The Greek Church and Protestant Missions"; "Syrian Home Life"; "Kamil"; etc. He died April 28, 1910.

Jest Book, a compilation of pleasantries, or a collection of witty sayings and practical jokes which go under the names of certain men who were celebrated in their day as "merry fellows." The oldest known English jest book is "A Hundred Mery Talys" (about 1525), to which the lively Beatrice refers when she says to Benedick, in "Much Ado About Nothing" (Act II. scene i.), "Will you tell me who told you that I was disdainful, and that I had all my good wit out of the "Hundred Merry Tales?" "Taylor's Wit and Mirth" (*i. e.*, John Taylor, the Water-poet), which, he tells us in the lengthy title page, he "chargeably collected out of taverns, ordinaries, innes, bowling greenes and alleys, ale-houses, tobacco-shops, highwayes, and water-passages," and which is "made up and fashioned into clinches, bulls, quirkes, yerkes, quips, and jerkes: apothegmatically bundled up at the request of John Garrett's ghost" (1635), is by far the most original of all English jest books — that is, it contains very few of the tales found in the earlier collections. The best known of English collections of facetiæ is "Joe Miller's Jest Book, or the Wit's Vade Mecum," which, even in its original form (1739), is a mere compilation of witticisms, drawn by the versatile John Mottley mainly from 16th and 17th century jest books, the best joke in it being the name of Joseph Miller (1684–1738) on the title page; for, though a comedian by profession, it is said that he was never known to make a joke in his life. Since that time the jest book has assumed many aspects, the most typical having been published in the United States under the name of Artemas Ward, and others.

Jesters, persons formerly kept in the households of princes and lesser dignitaries to furnish amusement by their real or affected folly, and hence commonly called court fools. At what time they were introduced into European courts has not been precisely ascertained, but there is reason to suppose that they existed in England during the period of Saxon history, and certainly in the reign of William the Conqueror, since an almost contemporary historian, Maitre Wace, has left a curious account of the preservation of William's life, when he was only Duke of Normandy, by his fool Goles. Other fools whose names have descended are the Hitard of Edmund Ironside, the Will Somers of Henry VIII., Archie Armstrong, who lost his office for jests which the petty-minded Laud could not endure; and in France Caillet and Triboulet in the time of Francis I., and Chicot in the reign of Henry III. Triboulet figures in Rabelais, and is the hero of Hugo's "The King Amuses Himself" and of Verdi's "Rigoletto." The last private person to keep a fool in England is said to have been Sir Pexall Brocas, who died in 1630. In Douce's "Illustrations of Shakespeare" (1807) will be found a very interesting dissertation on clowns and fools, with an account of their peculiar dress, the motley coat, the tight breeches with legs of different colors, the cowl bearing asses' ears, and crested with a cockscomb, and the bauble, a short staff with a ridiculous head. Douce divides them into nine classes, and finds the parent of the Shakespearian stage clown in the "vice" of the mysteries and moralities.

In the East the office of jester existed in the 8th century, and probably much earlier in India. The famous Calif Haroun al-Raschid had a jester named Bahalûl, some of whose sayings and doings have been preserved by Arabian writers.

Jesuits, or **Society of Jesus,** a religious order of the Roman Catholic Church. The great religious revolution of the 16th century, culminating in the Reformation, ran through the three stages which tend to occur in revolutions in general. First, there was a moderate departure from the previously existing state of things; then the Anabaptists burst loose from control and went into extravagances and excesses. Reaction then became inevitable, and if a suitable leader should arise was bound to become powerful. That leader was found in Don Inigo Lopez de Recalde, generally known from the castle of Loyola, where he was born in

1491, as Ignatius Loyola. He became an officer of great bravery in the army, though he was not above the ordinary military vices. Dreadfully wounded in 1521 while defending Pampeluna against the French, and long confined in consequence to a sick bed, he saw the vanity of the world, and, renouncing it, resolved in future on a devotedly religious life. When, on his recovery, he was at the University of Paris, he made converts of two fellow students who lodged with him, one a youth of aristocratic descent, Francis Xavier, afterward the Apostle of the Indies. In 1534 he and they, with four others, seven in all, formed a kind of religious society, the members of which preached through the country. On Aug. 15 of that year they took vows of chastity, absolute poverty, devotion to the care of Christians, and to the conversion of infidels. This was the germ of the Jesuit order. Loyola, like most other Spaniards of aristocratic descent, was devotedly attached to the old order of things, rudely shaken by the Reformation. A soldier, he bethought him of an army in which inferiors should give implicit obedience to their superiors. A general should command, and should have none above him but the Pope, to whom he should give loyal support. Paul III. issued a bull in 1540 sanctioning the establishment of the order with certain restrictions, swept away three years later. In 1542 Loyola was chosen general of the order, and afterward resided generally at Rome. His followers went everywhere giving special attention to the education of youth, the instruction of adults by preaching, the defense of Catholicism against heretics and unbelievers, and the conversion of the heathen and Mohammedans. His order spread with great rapidity, and at the death of Loyola, on July 31, 1556, consisted of above 1,000 persons, with 100 houses divided into 12 provinces. The Jesuits rendered great service to the papacy, but ultimately became unpopular with the civil government in most Roman Catholic countries. The people thought them crafty. In September, 1759, an order was given for the expulsion of the Jesuits from Portugal and Brazil. In 1764 the order was suppressed in France, and its property confiscated. On March 31, 1767, similar destruction overtook it in Spain, and soon after in Spanish America, and next, after 1768, in the Two Sicilies and Parma, till at length on July 21, 1773, the Pope issued a bull suppressing the order altogether. Austria and the other Roman Catholic States obeyed the decree. In August, 1814, Pope Pius VII. reëstablished it. In June, 1817, the Jesuits were expelled from Russia, and the British Roman Catholic Emancipation Act, passed in 1829, left them under some disabilities which have since been removed. The bill regulating religious communities, which went into force in France in 1901, greatly restricted the Jesuits in their educational work. Roman Catholic higher education in the United States is largely under the control of the Jesuits.

Jesuits' Bark, or **Peruvian Bark,** the bark of a certain species of *Cinchona*, so called because it was first introduced into Europe by the Jesuits.

Jesuits' Nut, a name sometimes given to the fruit of the *Trapa natans*.

Jesup, Morris Ketchum, an American banker; born in Westport, Conn., June 21, 1830; engaged actively in banking in 1852–1884, retiring in the latter year. In 1881 he became president of the New York City Mission and Tract Society, for which he built the DeWitt Memorial Church in Rivington street as a memorial of the Rev. Doctor DeWitt, his father-in-law. He was made president of the Five Points House of Industry in 1872; was a founder of the Young Men's Christian Association, of which he was chosen president in 1872; elected president of the Metropolitan Museum of Natural History in 1881, and of the New York Chamber of Commerce in 1899. He presented the Metropolitan Museum of Art a collection of native woods valued at $100,000; the Yale Divinity School, $51,000; the Woman's Hospital in New York city, $100,000; Yale University the Landbery Arabic MSS., and Williams College, $35,000, and provided funds for an anthropological exploration of Northwestern North America and Eastern Asia. He died Jan. 2, 1908; bequeathed $1,000,000 to the American Museum of Natural History.

Jesus Christ (*Iesous*, the Greek form of Joshua or Jeshua, contracted from Jehoshua, meaning, help of Jehovah, or saviour; *Christos*, anointed), the son of God, the Saviour of men, whose birth, life and death were predicted by prophets, and attended with miraculous manifestations of divine power; was born of the Virgin Mary, of the tribe of Judah, who was betrothed to Joseph, by occupation a carpenter, the descendant and heir of the house of David. Two genealogies of Joseph are given — one by Matthew, chap. i.; the other by Luke, chap. iv. The former is supposed to contain the list of heirs of the house of David, whether by direct or indirect descent; the other the direct ancestors of Joseph. Thus Jacob (Matt. i: 16) had no son, but a daughter, Mary; while his brother Heli had a son, Joseph, who married his cousin Mary, the heiress of his uncle Jacob and the mother of Jesus. It was foretold that Christ should be of the seed of Abraham and the son of David. The place of His birth was Bethlehem; the time, according to the received chronology, was in the year

Jesus Christ

of Rome 754. Scholars are now almost unanimously agreed that this date is too late, and it is generally placed about four years earlier, but the exact period is unascertained. Our information concerning Him is derived almost entirely from the accounts of His life written by the four evangelists Matthew, Mark, Luke, and John, and incidental notices in other parts of the New Testament.

The coming of a forerunner to the Saviour, John the Baptist, in the spirit and power of Elias, was foretold by an angel (Luke i: 17). The angel Gabriel announced to Mary that the power of the Highest should overshadow her, and that she should bear a son who should rule over the house of Jacob forever; and on the night of His birth an angel appeared to some shepherds, and announced the coming of a Saviour. On the eighth day He was circumcised according to the law of Moses, and on the 40th was presented in the temple, where the aged Simeon pronounced Him to be the light of nations and the glory of Israel. The coming of the divine infant was also hailed by the adoration of the Magi or wise men of the East, who were miraculously directed to the house where the young child was. Herod, alarmed by these indications, determined to destroy all the male children of Bethlehem and its vicinity of the age of less than two years, for the purpose of effecting the death of Jesus. But Joseph, being miraculously warned of the danger, fled to Egypt with the virgin and her child, and on his return, after the death of Herod, went to reside at Nazareth in Galilee, whence Jesus is called a Nazarene. We have no further accounts of the earlier years of Jesus except the remarkable scene in the temple when He was 12 years old, and the general observation of Luke, that He remained in Nazareth with His parents and served them. At the age of about 30 (Luke iii: 23) He was baptized by John in the river Jordan, the Spirit of God descending upon Him like a dove, and a voice from heaven proclaiming, "Thou art my beloved Son; in thee I am well pleased." Previously, however, to entering on His office of divine teacher He retired to a solitary place, where He passed 40 days in fasting, meditation, and prayer, previous to the remarkable scene of the temptation described by the evangelists — Matt. chap. iv.; Mark i: 12–13; Luke, chap. iv. He was afterward transfigured in the presence of three of His disciples, when Moses and Elias appeared to Him from heaven, and His raiment became white and shining, and His face shone as the sun. On this occasion again a voice came from heaven saying "This is my beloved Son; hear ye Him" (Matt., chap xvii.; Mark, chap. ix.; Luke, chap. ix., verses 28–36).

His mission is generally considered to have occupied three years, spent in acts of mercy (chiefly miraculous), in inculcating a purer system of morals, more exalted notions of God, and more elevating views of man and his destiny than had yet been presented to the world. A great part of His teaching was in parables which He frequently explained to His disciples. It has been observed by some critics that He had adopted the parabolic form of instruction after the Jews had shown a decided distaste for His teaching. His doctrine is embodied chiefly in the sermon on the mount (Matt. chap. v.–vii., and Luke, chap. vi.), containing the form of prayer He taught to His disciples, commonly called the Lord's Prayer; in His discourses to the Jews in John, chap. v.–viii. and x.; to His disciples, chap. xiv.–xvi.; and in His intercessory prayer, chap. xvii. His divine mission is evidenced not only by His miracles and the supernatural breadth and power of His teaching, but by the purity of His life, His devotion to the will of His heavenly Father, and His unwearied labors and sufferings for the good of men. He was equally unsparing in His denunciation of sin, and free in offering forgiveness to repentant sinners. He chose 12 apostles to be the companions of His ministry, the witnesses of His miracles, and the depositories of His doctrine; and He was betrayed into the power of His enemies by one of these with the mockery of a friendly salutation. Betrayed by one, denied by another, and abandoned by all He was carried before the Jewish priests, found guilty, and by them delivered over to the Roman magistrates, who alone had the power of life and death.

Condemned to death as a disturber of the public peace, He was nailed to the cross on Mount Calvary, and it was in the agonies of this bitter death that He prayed for the forgiveness of His executioners, and with a touching act of filial love commended His mother to His favorite disciple. The evangelists relate that from the hour of noon the sun was darkened and three hours after, Jesus, having cried out, "It is finished!" gave up the ghost. The vail of the temple, they add, was torn asunder, the earth shook, rocks were rent, and the tombs opened. The centurion who was present directing the execution exclaimed, "Truly this was the Son of God!" The body of Jesus was taken down by Joseph of Arimathea and placed in a tomb, about which the Jewish priests, remembering His prophecy that He should rise on the third day, set a guard, sealing up the door. Notwithstanding these precautions His prophecy was fulfilled by His resurrection on the first day of the week (Sunday), and He appeared repeatedly to His disciples to encourage, console, and instruct them. On

the 40th day after His resurrection, while with them on the Mount of Olives, after He had given them instructions to teach and proselytize all nations, promising them the gift of the Holy Spirit, a cloud received Him out of their sight, and He was taken up to heaven. While the disciples stood gazing after Him two men in white apparel appeared to them, and predicted His coming again in like manner as they had seen Him go. See the closing chapters of the four evangelists and Acts i: 1–14.

Jesus, son of Sirach, the author of the apocryphal book called Ecclesiasticus.

Jesus College, in Oxford, England, was founded by Queen Elizabeth in 1571. Many of the fellowships and scholarships are confined to persons born or educated in Wales. The college is thus distinctively the Welsh one. This was the first college founded on Protestant principles.

Jesus Island, an island of Lower Canada, surrounded by the St. John and Prairie rivers, the two branches of the Ottawa river before it joins the St. Lawrence river; area, about 1,200 square miles.

Jesus, Society of. See JESUITS.

Jet, a dense variety of lignite passing by degrees of quality into bituminous fossil wood, sometimes perfectly black, capable of being easily cut and carved and of receiving a very beautiful polish. It takes its name from Gagas or Gages, a place in Asia Minor where, according to Pliny, the substance was obtained, whence in his time it was called gagates, afterward corrupted into gagat, the modern German name, and jet. Jet is only a peculiar form of lignite, impregnated with bituminous matter, and containing about 37 per cent. of volatile matter. It is electrical when rubbed; hence it has been called "black amber" by the Prussian amber diggers. As a material for mourning ornaments jet is admirably adapted, and for that purpose is largely used. Imitations of jet ornaments are made in the hardened india-rubber called vulcanite or ebonite, and in glass.

Jethro, a king and priest of the Midianites, surnamed Raguel, who received Moses into his family when he fled from Egypt, and gave him his daughter Zipporah in marriage. When Moses had delivered the Israelites from their bondage, Jethro met him and delivered him his wife and children.

Jetsam. See FLOTSAM.

Jettee, the fiber of *Marsdenia tenacissima,* a small climbing plant of the natural order *Asclepiadaceæ,* of which the Rajmahal mountaineers make bowstrings, remarkable for their great elasticity, which they are supposed to owe in some measure to the presence of caoutchouc.

Jetty, in architecture, the part of a building which jets or juts over beyond the ground plan. In hydraulic engineering (1) a construction of wood, rubble-stone, or masonry projecting into the sea, and serving as a wharf or pier for landing and shipping, or as a mole to protect a harbor. (2) A structure round the piled foundation of a bridge pier.

Jeunesse Dorée (zhuh-nes′ dō-rā′) ("gilded youth"), a party name given to those young men of Paris who, during the French revolution, struggled to bring about the reaction or counter-revolution after Robespierre's fall (July 27, 1794). Other nicknames bestowed on the same party were *Muscadins* ("scented darlings") and *Petits Maîtres* ("elegants"). The term *jeunesse dorée* is still in use to designate young men about town, who always go elegantly dressed, have the air of spending money, and live a butterfly life of enjoyment and pleasure.

Jeux Floraux (zhuh flō-rō′), the name given to a poetical contest which takes place annually at Toulouse, in France. It originated in the early part of the 14th century, in an attempt by the citizens of Toulouse to revive the poetry of the Troubadours. Seven persons were united into a society under the name of the "Seven Troubadours of Toulouse," and in 1323 they sent a letter, in verse, to all the poets of Provence, inviting them, on May 3, 1324, to a poetical contest, when the composer of the best poem was to receive a violet of fine gold. The celebrated troubadour Arnaud Vidal gained the prize. Two other prizes were soon after added, to increase the splendor of the festival — a wild rose and a pansy, both of silver. Similar institutions were afterward established at Barcelona and Tortosa, and the original institution began to decline, and at the end of the century it was nearly extinct, when it was revived by Clemence Isaure, who left, by will, a considerable sum for the continuance of this festival.

Jevons, William Stanley, an English logician; born in Liverpool in 1835; was educated at University College, London; held an appointment in the royal mint in Australia from 1854 to 1859; graduated at London University in 1862; was appointed Professor of Logic, Mental and Moral Philosophy, and Cobden lecturer on political economy in Owens College, Manchester, afterward Professor of Political Economy in University College, London, a post which he resigned in 1881. Among his works are "Elementary Treatise on Logic" (1870); "Theory of Political Economy" (1871); "Principles of Science" (1874); and many essays and addresses on economic questions. He was drowned in 1882.

Jew, The Wandering, a mythical personage who forms the subject of many popular traditions. According to one account, he was a carpenter; and as our Saviour passed his workshop on his way to execution, the soldiers begged that he might be allowed to enter for a few moments and rest; but he not only refused, but insulted him. By another account he was a shoemaker, sitting at his bench as our Saviour passed to Calvary, and not only refused to allow him to rest for a few moments, but drove him away with curses. Jesus calmly replied, "Thou shalt wander on the earth till I return." Driven by fear and remorse, he has since wandered, according to the command of our Lord, from place to place, and has in vain sought death amid all the greatest dangers and calamities to which human life is subject. The legend first appears in the Chronicle of Matthew Paris, in the 13th century, where the Wandering Jew is called Cartaphilus, and is said to have been a servant of Pilate. His name in the later legends is Ahasuerus. In the 16th and 17th centuries there appeared several impostors claiming to be the Wandering Jew. This legend has formed the subject of long poems by Schubart and Mosen; of a tragedy by Klingmann; of a mystico-philosophical drama by Edgard Quinet; of prose romances by George Croly ("Salathiel"), Alexandre Dumas, the elder ("Isaac Lakadam"), M. Œlckers, and David Hoffman ("Chronicles Selected from the Originals of Cartaphilus"); "The Wandering Jew," by Eugene Sue; "The Prince of India," by Lew Wallace; and of numerous small lyrical pieces.

Jew Bush, *Pedilanthus tithymaloides,* a plant of the order *Euphorbiaceæ.* It grows in the West Indies, and is used in decoction as an antisyphilitic and in cases of suppression of the menses. It is also called milk plant.

Jewel, John, an English clergyman; born in 1522. His great controversial ability made him one of the foremost churchmen of his age, and his "Apology of the Anglican Church" (1562) retains its value. He died Sept. 22, 1571.

Jewelry, a collective name for articles intended for personal decoration, made of precious metals, which may be enriched with stones or enamels. But objects, also, not intended for personal use, such as caskets, when decorated with precious stones, are said to be jeweled. Popularly, there is much confusion between the terms gem and jewel; the former belongs especially to engraved stones.

Before the use of metals was known, jewelry, if it can be so termed, consisted of carved beads and fragments of such bright substances as were at the command of prehistoric man. Gold is the first metal of which there is any mention in literature, and there is no doubt that, being always found native, it was the first to be used by mankind. The earliest gold ornaments would be the native pellets of the metal as found, and when mankind possessed no mechanical resources beyond rude hammers of stone, with which to beat out these pellets, the possibilities of decorative treatment of gold were very limited. The ability to melt metals and so to obtain masses of large size upon which to work implies a very advanced knowledge, which, however, artificers must have attained at a very early period. Among the numerous finds of gold jewelry of prehistoric times there are many specimens which show that the early artificers possessed considerable command over their material in the way of hammering out plates to uniform thickness, drawing or beating the metal into wire, and plaiting and twisting it into torques, armillæ, rings, and other forms of ornament. In these earliest gold ornaments there is no attempt at decorative treatment other than that what could be produced by the hammer; and it is only by degrees that simple efforts at chasing, engraving, and embossing make their appearance. The most archaic gold ornaments discovered by Dr. Schliemann in his excavations at Hissarlik, which he regards as ancient Troy, are treated with the hammer alone; the later gold ornaments of Mycenæ are of a much more developed character, showing a knowledge of chasing and embossing. It is only when we come to historical times that we find artificers had obtained command over their material and tools sufficient to enable them to produce jewelry which bears a distinct impress of the art and ornament of their period and nation.

The distinction between jewelry of the present day and that of earlier times is found in the fundamental fact that the old work is the creation of the craftsman, while the modern jewel is the product of a manufacturer who adopts all labor-saving machines and appliances for the economical finishing of his wares. The lowest class of jewelry is made from sheet copper struck up in dies and molds by means of the screw press, then gilded by electro-deposit and adorned with glass pastes in imitation of diamonds and all other precious stones. The cheap and rapid production in limitless numbers of imitation articles is thus secured, but the objects themselves are utterly devoid of artistic significance. To a large extent it is the same with jewelry even of the most expensive description, for though it is not stamped out of the sheet,

yet the different portions of the work are allotted to separate workmen who perform their task with mechanical accuracy, but in no case is the whole article at once the conception and the execution of the single individual, as was the case with the work of the ancient jeweler.

Jewett, Sarah Orne, an American writer; born in South Berwick, Me., Sept. 3, 1849. She received an academic education. Her works include: "Old Friends and New"; "Play Days"; "Country By-Ways"; "Deephaven"; "The Mate of the Daylight, and Friends Ashore"; "A Country Doctor"; "A Marsh Island"; "A White Heron and Other Stories"; "The Story of the Normans," a historical works; "The King of Folly Island, and Other People"; "Betty Leicester"; "Strangers and Wayfarers"; "A Native of Winby, and Other Tales"; "The Life of Nancy"; "The Country of the Pointed Firs"; etc. She died June 24, 1909.

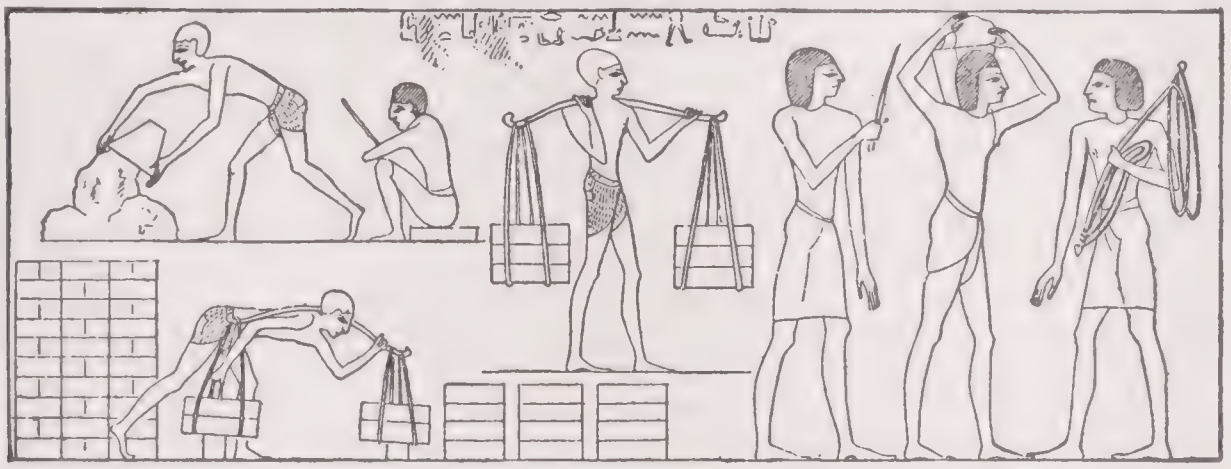
SARAH ORNE JEWETT.

Jew Fish, the name given to two species of large fishes well known in American waters. The one known also as the guasa or black grouper (*Promicrops itaira*) sometimes reaches the weight of 700 pounds; the other (*Stereolepis gigas*) inhabits particularly the Californian coast, often weighs 500 pounds, and has flesh of excellent quality.

Jewish Era, a calendar period of Hebrew origin. The Jews usually employed the era of the Seleucidæ till the 15th century, when a new mode of computing was adopted. They date from the creation, which they consider to have been 3,760 years and 3 months before the commencement of our era. To reduce Jewish time to ours, subtract 3,761 years. The Jewish year consists of either 12 or 13 months, of 29 or 30 days. The civil year commences with the month Tisri, immediately after the new moon following the autumnal equinox; the ecclesiastical year begins with Nisan.

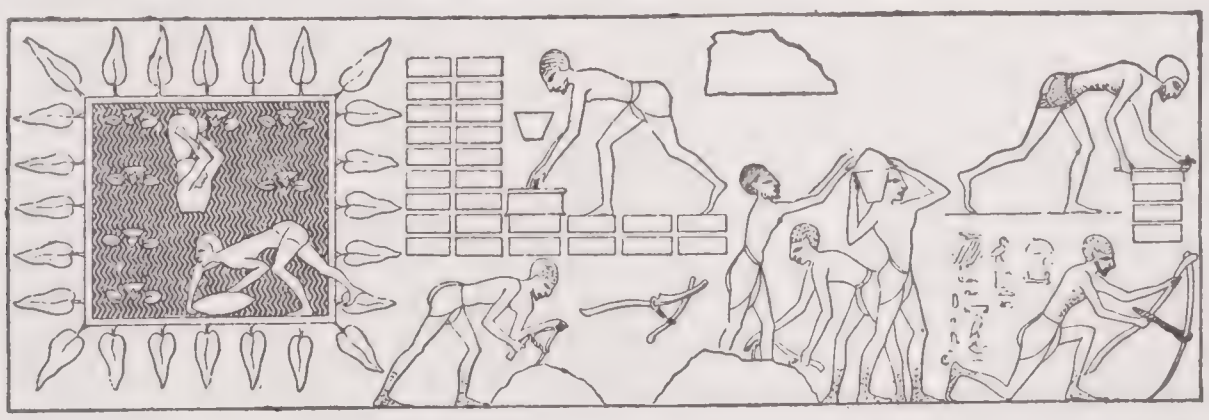
Jews, Hebrews, or **Israelites,** a people, whose ancestors appear very early in the written history of mankind on the banks of the Euphrates, Jordan, and Nile, and whose fragments are now to be seen, in large or small numbers, in almost all the cities of the world; and though thinly scattered both among the rudest and most civilized nations, preserving through thousands of ages common features, habits, religion, literature, and the same language — a phenomenon unparalleled in history. Descended from Abraham, the Jews were at first called Hebrews, from the alleged ancestor of that patriarch, Heber. After the time of Jacob, their first appellation was replaced by the word Israelites, from Israel, a surname of Jacob. The term Jew, derived from Judæus, dates from the captivity in Babylon. The Jewish people assign their origin to Abraham, whom they designate the father of their race. After Abraham, Isaac, his son, became their chief; then Jacob, or Israel, the son of Isaac. Jacob had 12 sons, among them Judah, the ancestor of David and of Jesus Christ. The descendants of Jacob multiplying very rapidly, they were eventually divided into 12 tribes, each of which was regarded as having been founded by one of the children of Jacob. In the closing years of his life Jacob settled in Egypt, in the land of Goshen. His posterity, powerful at first, were afterward enslaved and persecuted by the Pharaohs. Moses delivered them from their bondage in Egypt and put himself at their head to conduct them into the land of Canaan. Under his leadership the Jews miraculously passed the Red Sea, when Pharaoh and all his host were drowned. After wandering for 40 years in the desert, where Moses died, they reached the Land of Promise, their leader being Joshua, who had succeeded Moses. Joshua established the Jews in the Land of Promise, and dividing the country into 12 parts gave a portion to each of the 12 tribes. After Joshua, the government was confided to a council of elders, then to judges; subsequently it became monarchical. Saul was the first King of the Jews; David succeeded him, and was followed by Solomon. These three kings established the dominion of the Jews throughout the ancient land of Canaan, and, for a short period, the kingdom extended to the Euphrates and the Red Sea, on which Solomon possessed the port of Elath. But on the death of the last king the 12 tribes were divided, and from that schism sprang two kingdoms. The kingdom of Judah remained faithful to the lineal descendants of David, and offered allegiance to Rehoboam, son of Solomon; the kingdom of Israel elected for its sovereign Jeroboam. These two kingdoms, weakened by perpetual warfare and discord, were in the end enslaved. The kingdom of Israel was destroyed by Shalmaneser, King of Assyria, and the kingdom of Judah by Nebuchadnezzar, who first car-

ried captive to Babylon a great part of the inhabitants, and afterward took Jerusalem by assault, destroyed the temple, and reduced to slavery the whole of the people. After a captivity of 70 years the Jews obtained from Cyrus permission to reëstablish themselves in Jerusalem, where they were governed by high priests. After the fall of the Persian empire the Jews passed successively under the dominion of Alexander; of Ptolemy, King of Egypt; of Seleu-



CAPTIVITY OF THE JEWS: LABORERS.

cus Nicator, King of Syria; and after once more falling under the sway of the kings of Egypt were subsequently enslaved by the Syrians. Against these the Jews rose, under the leadership of Maccabæus, and threw off their yoke. The Maccabees became the hereditary sovereigns. Subsequently the Romans interfered in the internal affairs of the Jewish kingdom and placed Herod I. on the throne of the Maccabees, 37 B. C. It was under the reign of Herod that our Saviour was born. After the death of King Herod, Palestine was distributed among his sons, and divided into four portions, called



CAPTIVITY OF THE JEWS: MASONS.

tetrarchies (Judæa, Galilee, Abilene, Ituræa); but in a few years the Romans sent into the country a pro-consul, who governed in their name, and shortly afterward Rome was sole master of the whole kingdom.

The Jews, impatiently supporting the Roman sway, revolted many times. The Emperor Titus took Jerusalem in the year 70, after a fearful siege of five months, as was prophesied. The city was again taken, under Adrian, in the year 135: the Jews were in great part exterminated; those who survived being driven forever from Jerusalem. From this period the Jews, ceasing to form an independent nation, have been scattered over the earth. When Christianity became the religion of the Romans, their condition became very miserable. In 418, military service was interdicted them; in 610 the Emperor Heraclius persecuted them with many cruel enactments. Islamism treated them less rigorously. Under the reign of the Caliphs, the Jews of Asia, of Africa, and of Spain, were permitted to live in peace, and to cultivate commerce, letters, and the sciences. In Christian Europe, especially during the period of the Crusades, the Jews had to undergo every form of persecution, frequently being compelled to purchase life at the price of their hoarded gold; they were made to wear distinctive marks on their clothing, and afterward to dwell in separate quarters of every city. They were driven from England in 1290, from Central France in 1395, and from Spain and Sicily in 1492. In Germany, they belonged, like serfs, to the emperors and the nobles, who bought and sold them at their pleasure. The Inquisition was a particularly bitter foe to the Jews, especially in the Spanish dominions. In the 16th century, their condition became much im-

proved. In France they were allowed to settle at Bayonne and Bordeaux in 1550; in 1784 they were relieved from the poll tax which had hitherto been imposed on them. Shortly afterward the other European States, following the example of France, treated them in a more liberal spirit.

The Jews are spread over every quarter of the globe, being exceedingly numerous in Germany, Poland, and the N. of Africa — in Algiers in particular. Though intermixed for 1,800 years with so many diverse nations, the Jews have not only preserved their religion, as already said, but a certain national type of feature, of which the most salient points are a dark skin, thick lips, and an aquiline nose. The Jews belong to the Semitic race, as is proved by their language, which is allied with the Arabic, the Syriac, and the Chaldean. Their primitive life was patriarchal, pastoral, nomadic perhaps — certainly so in the desert between their departure from Egypt and entrance into the Land of Promise. According to the Holy Scriptures they had many vices, joined to which were superstition, a readiness to fall into idolatry, a spirit of discord and of revolt. In addition to the Old Testament they possess a literature which chiefly consists of legends, songs, proverbs, and genealogies. After their return from captivity in Babylon, philosophy and theology began to take their rise among the Jews, and a number of sects sprang up, such as the Pharisees, Sadducees, and Essenes. During the Middle Ages, the Jews were instrumental, like the Arabs, in handing down the learning of antiquity.

In our own day and in almost every country they have illustrious representatives in all departments of business activity, though they have accomplished little along scientific and artistic lines. Their religion is founded entirely on the Old Testament; it denies the divinity of Jesus Christ; but nevertheless teaches its followers to believe in the coming of the Messiah, who will collect the scattered Jewish people and found a great empire. The Jews admit no other revelation than that of Moses and the prophets; they observe at the present time the same ceremonies which the ancient Hebrews practised — the celebration of the Sabbath, the Passover, the abstinence from certain viands which are termed unclean. With the ancient Jews all the priests were of the tribe of Levi; they thus bore the name of Levites, which, at the present time, is changed to rabbis. After the dispersion of the Jews, during the reign of Adrian, the principal doctors of religion assembled at Tiberias, where they formed a grand council, or Sanhedrim, and founded a school which became the nursery of their rabbis. These last composed, under the title of the Talmud, a work designed to contain the oral law and traditions of the Jews. This work was completed in the year 500 of the Christian era; and, with the greatest portion of the Jews, it became the basis of their faith; some, however, refused to accept it. Hence arose the division of the Jews into two rival sects — the Talmudists, or Rabbinists, who follow the Talmud; and the Caraites, who follow the strict letter of the Old Testament. See ANTI-SEMITES.

Jewsbury, Geraldine Endsor, an English novelist; born in Measham, Derbyshire, England, in 1812. Her novels, "Zoë, the History of Two Lives" (1845), "The Half-Sisters" (1848), "Right or Wrong" (1859), and others of like charm and interest, met with success. She died in London, England, Sept. 23, 1880.

Jewsbury, Maria Jane, an English poet and prose-writer, sister of Geraldine; born in Measham, Derbyshire, England, Oct. 25, 1800. She wrote: "Phantasmagoria, or Sketches of Life and Character" (1824), and the fascinating "Letters to the Young" (1828) during a severe illness. Her "Lays of Leisure Hours" (1829) attracted general admiration, and her "Three Histories: the History of an Enthusiast, the History of a Nonchalant, the History of a Realist" (1830) ran through four editions. She married Rev. W. K. Fletcher, an Indian missionary. She died in Poonah, India, Oct. 4, 1833.

Jew's Ear, a fungus, one of the *Hymenomycetes,* which grows on decaying parts of living trees, particularly elders. It is a native of Great Britain. In size and form it bears some resemblance to a human ear. It is soft but cartilaginous, wrinkled, and generally brown. It is stemless. The spores are produced on the upper surface. The under surface is fibrous and downy. Jew's ear was formerly in repute as a tropical discutient and astringent. It may be kept long in a dried state. It is still sold, but *Polyporus versicolor* is often substituted for it. The genuine Jew's ear, after being dried, swells when immersed in water; the *Polyporus* does not.

Jew's Eye, or **Jewess' Eye,** a popular simile for anything extremely valuable. The extortions to which the Jews were subject in the Middle Ages, and the cruel mutilations to which they were exposed if they refused to pay the sums demanded of them, probably gave rise to this expression. Collier notes that in the older editions this expression is printed "Jewes eye," and says it may be a question whether Shakespeare did not mean that Launcelot should merely

repeat the phrase, leaving "Jewes" to be pronounced as a di-syllable.

Jew's Harp, a simple musical instrument held between the lips, the sound coming from the vibrations of a tongue of metal, bent at a right angle, which is set in motion by being twitched with the forefinger. The sound is increased in intensity by the breath, and altered in pitch by the shape of the cavity of the mouth, which acts as a reflector. This name some derive from *jeu*, play, from the fact of its being a toy; but more probably it is a derisive allusion to the harp of David.

Jeypore. See JAIPUR.

Jezebel, a Jewish queen, celebrated for her impious life. She was daughter of Ethbaal, King of Sidon, and wife of Ahab, King of Israel. She turned her husband from the worship of the true God, established temples to the idol Baal, and caused a large number of prophets and holy persons to be put to death. Jehu, on gaining the throne, flung her from the windows of her own palace, which killed her, the dogs devouring her, as had been foretold. Her name, given by St. John, probably as a descriptive epithet, to a certain female of Thyatira, in his day holding a like bad preëminence in profligacy of life, has become a proverb, and is commonly applied to a forward, rapacious, or vile woman.

Jezirah (-zī'rä), one of the two principal works of the KABBALA (*q. v.*), its date being assigned by some to the 1st, by others to the 8th or 9th century.

Jezreel, a city of Issachar (Josh. xix: 18), lying W. of Bethshean. Jezreel was called Esdraela in the time of the Maccabees, and is now replaced by a small and ruinous Arab village called Zerin, at the N. W. point of Mount Gilboa. Also the name of the great plain lying between Jezreel and Acre.

Jezreelites, or the **New and Latter House of Israel,** a religious sect founded in England by a private soldier, James White (1840–1885), who adopted the name of James Jershom Jezreel, and professed to be a messenger from God, whose revelations to him are recorded in "The Flying Roll." The headquarters of the sect were at Gillingham, in Kent, where a temple, a college, etc., were partially built. Christ, they believed, by his death redeemed only souls, and those souls who have lived since Moses. For the salvation of the soul belief in the Gospel was sufficient; the body must be saved by belief in the Law. When Christ comes to reign for His millennium He will be greeted by the 144,000 (Rev. vii: 5–8), who will be endowed with immortal bodies; to this chosen band the members of the New and Latter House of Israel aspire to belong. After the death of Queen Esther, Jezreel's widow, in 1888, the sect died out.

Jhelum, or **Jehlam** (jel'um), also called the BITASTA (whence the ancient Hydaspes), one of the rivers of the Punjab. It rises in the mountains of Kashmir, which country forms its upper basin, and is navigable for about 70 out of 130 miles within that State. On the banks of this river was fought the battle between Alexander the Great and Porus.

Jib, a large triangular sail set on a stay, forward of the fore stay-sail, between the fore-top mast-head and jib-boom in large vessels. It occupies a position between the mast-head and bowsprit in cutters, schooners, and small craft, and does not necessarily run on a stay. Jibs are known by various names, according to position, etc., as inner-jib, outer-jib, standing-jib, flying-jib, spindle-jib, storm-jib, jib-of-jibs. A jib-topsail or balloon-jib extends toward the topmast head, and in cutter yachts is sometimes a very large sail. Also, the extended arm of a crane; or that spar of a derrick which is stepped at the bottom and connected by tackle at the top to the vertical post. The post is maintained vertical by guys, and the tackle affords a means for adjusting the inclination of the jib, the fall being carried from the top of the post to a small crab on the ground, distinct from the larger crab which operates the hoisting-tackle. The jib of a derrick is stepped, and is adjustable in inclination. The jib of a crane is fast to the frame and rotates horizontally with it, or is journaled to the frame and is adjustable thereon, sometimes vertically for height; always horizontally for sweep.

Jibing. See GIBING.

Jiblet-cheek. See GIBLET-CHEEK.

Jiddah, or **Jeddah,** a seaport of the Hedjaz, Arabia; on the Red Sea, about 65 miles W. of Mecca. It is an unhealthy town, suffers greatly from want of water, and is surrounded by a desert. It owes its importance to the fact that it is the port of Mecca, and consequently the place of disembarkation for pilgrims bound for the Holy City.

Jig, a lively dance which may be performed by one or more dancers. It is popular among many nations, is distinguished by various titles, and has a certain amount of difference in the steps according to the habits and customs of the people by whom it is adopted. With some it is a sober, steady, jog-trot sort of a country dance; with others it is a wild, savage exercise, without point or meaning. With some it is made a means of displaying the agility of the lower limbs of a combined company of dancers; with others it is a terpsichorean

drama for two performers, in which all the emotions excited by love are represented by gestures and monosyllabic cries. As a movement in a "suite," the jig is found in works produced toward the latter part of the 17th century, and onward to the time of Haydn. At first the phrases were short, and of no more variety than was needed for the purposes of the dance, for the jig was occasionally one of the figures of the country dance. But later it was made the vehicle for display in harpsichord playing, and was lengthened and elaborated and became the origin of the last movement of the sonata. It was written in 2-4, 3-8, 6-4, 6-9, 9-4, 9-8, and 12-8 time; the peculiarity of the rhythm of triplets was nearly always preserved, if not insisted upon. See GIG.

Jihad or **Jehad** (jē-had′), a holy war proclaimed by the Mussulmans against Christians. The Sheeahs do not consider it legitimate to do this. The Soonees reserve the measure for great emergencies. Fanatics attempted to set one on foot in India in 1877. Sheik ul Islam, at Constantinople, proclaimed one against the Russians about 1877.

Jilolo. See GILO.

Jimcrow (from the burden of an old song), an implement for bending or straightening rails. The jimcrow planing machine is furnished with a reversing tool, to plane both ways, and named from its peculiar motion, as the tool is able to "wheel about and turn about." The table is moved endways by a quick-threaded screw, which allows the driving motion to be placed at the end.

Jimenez (HĒ′MĀ-NĒZ), a town of Chihuahua, Mexico, on an affluent of the Conchos river, 271 miles S. of El Paso, and 125 miles S. E. of Chihuahua city. The output of the Parral mining district, 50 miles W., is shipped here. Pop. 8,000.

Jimmu-tenno (jim′mö-ten′nō) ("Jimmu the emperor"), the supposed founder of the present Japanese dynasty, 5th in descent from the sun, and said to have ascended the throne in 660 B. C., the year from which the national records are dated. The national holiday, Feb. 11, is devoted to his worship.

Jin, or **Jinn,** in Mohammedan mythology, one of a race of genii said to have had for their male progenitor Jan, and for their female one Marija. They differ from man in their nature, their form and their speech. They are spirits residing in the lowest firmament, and have the power of rendering themselves visible to man in any form they please. The bodies they assume are material, but not grosser than the essence of fire and smoke. The extent of their knowledge is unknown. Their character is good.

Jingal. See GINGAL.

Jingo, a word whose derivation is unknown, but supposed by some to be a corrupted form of Jainko, the Basque name for the Supreme Being. It was first used as a political term in the Russo-Turkish War of 1877–1878, and was applied to a class of politicians who continually urged on Disraeli, then the Prime Minister, the necessity of taking sides with the Turks as the only patriotic and proper foreign politics. The word was adopted from "McDermott's War Song"—that is, the song sung in music halls by McDermott and very popular at the time. The chorus ran thus:

"We don't want to fight, but, by Jingo! if we do,
We've got the ships, we've got the men, we've got the money, too."

Since that time, the word has been used in both Europe and the United States as meaning one who advocates a spirited and aggressive foreign policy.

Jingo-Kogo ("Jingo the empress"), a Japanese ruler. On the death of her husband the emperor Juai in 201, she became regent for her son Ojin-Tenno. She is said to have conducted an expedition into Korea. After death she was deified as Kashi Dai-Miōjin. The Japanese paper currency of 1884 bears her figure. She died in 269.

Jinrickishaw (-rik′-) ("man-power vehicle"), a light two-wheeled carriage, resembling a gig, containing one or two persons, and drawn by a human runner between the shafts, universally used in Japan. It dates from about 1868. The fare is from two to five cents a mile.

Jirásek, Aloys (yē-räs′ek), a Czech novelist; born in Hronov, Bohemia, in 1851. His talent is for the production of faithful and effective word-paintings of Czech life and character; "Between the Streams," "Against All," and "In Foreign Service," being typical examples.

Jitomir, or **Zhitomir** (zhit-om′ēr), capital of the government of Volhynia, Russia; on the Tetereff; is an ancient Lithuanian city. Pop. (1897) 65,452.

Joab, son of Zeruiah, David's sister, and brother of Abishai and Asahel, was the commander of David's army during almost the whole of his reign (II Sam. v: 6–10). Valiant but unscrupulous, he committed many crimes, and was at length put to death by Solomon, (I Kings ii.)

Joachim, Joseph (yō-ä′kēm), a Swiss story-writer; born in Kestenholz, near Solothurn, April 4, 1835. The son of a peasant, and without early advantages, he did not take to the pen till mature life; but "Lonny, the Homeless" (1889), "The Brothers" (1891), Mother Lenen's Revenge" (1892), and other tales of village peasant life, gave him renown.

Joachim, Joseph (yo-ä′kim), a German violinist; born in Kittsee, near Presburg, June 28, 1831. He first appeared in London in 1844. His performances at Vienna, Pest, Paris, and London established for him the position of one of the first violinists of the day. He died Aug. 15, 1907.

Joachim, St., Order of, an equestrian order of Franconia, founded in 1755 by an association of younger members of the German aristocracy. It was originally named the "Order of Defenders of the Honor of Divine Providence," and received its present title in 1785.

Joachimite, a follower of Joachim, Abbot of Floris, in Calabria. The Joachimites are classed with the Fratricelli. They were condemned by the Council of Lateran in 1215, and by that of Arles in 1260–1261.

Joan, Pope, a famous mythical personage. When Pope Leo IV. died in 855, the clergy and people of Rome having met to elect his successor, chose a young priest, a stranger in Rome, who had acquired an immense reputation for learning and virtue, and styled him John VIII. The supposed priest was in reality a young Englishwoman, daughter of an English missionary, who had been established at Fulda. Beautiful and talented, she had fascinated a monk of the convent at Fulda, who succeeded in inducing her to assume male attire and enter the convent as a brother. The guilty intercourse carried on by means of this disguise became at length so dangerous as to force the lovers to fly. They wandered through Europe, both learning and teaching, till at Athens, where they were studying Greek, the monk died. Joan made her way in time to Rome, and opened a school which soon became the resort of all lovers of learning. After her election the administration of Rome and the Church was conducted with great ability, and the praise of John VIII. was universal. In the hour of her elevation, however, Joan fell again into the sin which had first tempted her; and heedless of the consequences she was acting her part in a solemn religious procession on one of the rogation days, when she was seized with the pains of labor at a spot lying between the Church of St. Clement and to the horror of all present gave birth to a child in the open street. Both parent and child died. This tale, which the opponents to the Catholic cause vehemently maintained, was at length overthrown by a French Protestant minister named Blondel.

Johannes Scotus. See ERIGENA.

Joan of Arc, or **Jeanne d'Arc,** the Maid of Orleans; born of poor but devout parents, in the village of Domremy, Jan. 6, 1412. Her religious faith was ardent almost from her cradle. During that unhappy time of national degradation a prophecy, ascribed to Merlin, was current in Lorraine, that the kingdom lost by a woman (Queen Isabella) should be saved by a virgin and no doubt this together with her visions, helped to define her mission to the brooding and enthusiastic mind of the young peasant girl. "I had far rather rest and spin by my mother's side," she said with simple pathos, "for this is no work of my choosing, but I must go and do it, for my Lord wills it." Her story was at first laughed to scorn, but her persistence bore down all opposition, and at last she succeeded in making her way to the Dauphin and convincing him by secret signs of her sincerity.. "There is more in God's book than in yours," she said to the doubting and hesitating theologians. She put on male dress and a suit of white armor, mounted a black charger, bearing a banner of her own device — white, embroidered with lilies, on one side a picture of God enthroned on clouds, on the other the shield of France supported by two angels, together with a pennon on which was represented the Annunciation. Her sword was one that she divined would be found buried behind the altar in the Church of St. Catharine de Fierbois. Thus equipped she put herself at the head of an army of 6,000 men, dictated a letter to the English, and advanced to aid Dunois in the relief of Orleans, which was hard beset by the victorious enemy. Her arrival fired the fainting hearts of the French with a new enthusiasm, and rough and hardened soldiers left off their oaths and their debauchery under the spell of her pure presence. On April 29, 1429, she threw herself into the city, and, after 15 days of fighting, the English were compelled to raise the siege and retreat, carrying with them the tale of terror at the strange witchcraft by which they had been overcome. At once the face of the war was changed, the French spirit again awoke, and within a week the enemy were swept from the principal positions on the Loire. Amid the carnage and confusion of her strange surroundings Joan showed the same purity, simplicity, and good sense that had marked the village girl. She shrank with womanly tears from the sight of bloodshed, and trembled with terror at her first wound, while the brutal taunts of the English soldiers stung her purity to the heart and drew hot tears of indignation from her eyes. But all thoughts of self were lost in devotion to her mission of which heaven had given such infallible proofs, and now, with resistless enthusiasm, she urged on the weak-hearted Dauphin to his coronation. Less than three months later she stood beside him at Rheims, and with tears of joy saluted him as king. "Would it were God's pleasure," she said to the archbishop, "that I might go and keep sheep once more with my sisters and my brothers: they

would be so glad to see me again." She continued to accompany the French armies, and was present in many conflicts, and was mortified to the heart by the failure to carry Paris. At length, on May 24, 1430, she threw herself with a handful of men into Compiègne, which was then besieged by the forces of Burgundy; and, being driven back by them in a desperate sally, was left behind by her men, taken prisoner, and sold to the English by John of Luxembourg, in November, for 10,000 livres. In December she was carried to Rouen, the headquarters of the English, heavily fettered and flung into a gloomy prison, and at length arraigned before the spiritual tribunal of Pierre Cauchon, then Bishop of Beauvais and a wretched creature of the English, as a sorceress and a heretic, while the king left her to die. Her trial was long, and was disgraced by every form of shameful brutality, under hardly even the form of justice. She was burned at the stake, May 30, 1431.

Joanna, one of the faithful women who ministered to Christ while living, and brought spices to his tomb. Her husband Chuza was a steward to Herod Antipas (Luke viii: 3; xxiv: 1–10).

Joannina. See JANINA.

Joaquin Miller. See MILLER.

Joash, or **Jehoash,** the 8th King of Judah; born in 878 B. C. He was the only son of Ahaziah who was not slain by the usurping Athaliah, his grandmother. Being rescued by Jehosheba his aunt, and secluded six years in the temple, he was raised to the throne, when seven years of age, through the faithful care of Jehoiada; and while this venerable man survived, Joash served God and prospered. Idols were banished, and the temple was repaired. But afterward he followed less wholesome counsels; idolatry revived; and when Zechariah, the high priest rebuked the guilty people, the ungrateful king caused this servant of God, the son of his benefactor, to be stoned to death. Misfortunes soon multiplied on his head; he was repeatedly humbled by the Syrians, and gave them the temple treasures as a ransom; a loathsome disease imbittered his life, which was soon cut short by a conspiracy of his servants, and he was not buried in the sepulcher of the kings (II Kin. xi, xii; II Chr. xxiii: xxiv). The prophet Joel was contemporary with him. He died in B. C. 838.

Joash II., the son and successor of Jehoahaz, King of Israel. There was much in his conduct to commend. He had a great regard for the prophet Elisha, and visited him on his death bed, where by a divine oracle he was assured of three victories over the Syrians. He was also victorious when forced to give battle to Amaziah King of Judah, and was one of the best kings of Israel. (II Kin. xiii: 9–25; xiv: 1–8; II Chr. xxv.)

Job, a patriarch notable for his patience. In the English version of the Bible, Job stands 1st in order of the poetic books of the Old Testament, but it is the 3rd in the Hebrew Scriptures, Psalms and Proverbs preceding it, and the Song of Solomon coming next. A prologue (ch. i. ii.) and the conclusion (ch. xlii: 7–17), are in prose. The rest is poetry and of a very high order. In the historical prologue Job is introduced as deeply pious and exceedingly prosperous. Satan insinuates that he is pious simply because God has bribed him to be so by means of his prosperity. Remove the latter, and the former will also depart. Instead of blessing, he will curse God to His face. To prove the falsity of this charge, Satan is allowed to strip Job of possessions and children and to afflict him with a loathsome disease. The patriarch bows uncomplainingly to the Divine decision, while the piety of his wife breaks down in the trial. Job's three friends — Eliphaz, Bildad, and Zophar — arrive to comfort him, and the poetry begins. Job, in despair, curses the day of his birth; Eliphaz replies, and Job makes a rejoinder. Bildad follows, and Job answers him. Zophar next speaks, and Job again replies (ch. iii.–xiv.). Each of the three friends speaks anew, Job thrice replying (xvi–xxii). Then follow Eliphaz and Job, and Bildad and Job, Zophar remaining silent. A fourth speaker, a young man, Elihu, dissatisfied with the reply of the elder three, feels vehemently moved to put in his word, and does so (xxxii–xxxvii). All the four proceed on the erroneous notion that whoever suffers more than others must have previously sinned more grievously than they (Luke xiii:1–5). They infer that Job must have done so, Job, on his part, having long since been provoked to exclaim: "Miserable comforters are ye all!" (xvi: 2). Jehovah then answers the patriarch out of the whirlwind, and vindicates his conduct and views, Job answering in deepest abasement (xxxviii.–xlii: 6). The comforters are censured, are enjoined to offer sacrifice, and are pardoned on the intercession of Job, to whom are born exactly the same number of children he had lost (see i: 2, and xlii: 13), while he is granted twice the possessions, though before he "was the greatest of all the men of the earth." (see i: 3 and xlii: 12.) He lives 140 years after his trial.

The book of Job is absolutely unique in the Old Testament. The hero is not a Jew. While the name Jehovah is used, the whole history of the Mosaic law and the chosen people is ignored. The author seems well acquainted with Egypt, its crocodiles (xli.), and its pyramids (?) (iii: 14), and the

desert with its ostriches (xxxix: 13–18), its wild asses (xxiv: 5, xxxix: 5–8), and its too successful, tent-living predatory tribes (xii: 6). The language is Hebrew, with various Aramaisms, and with a faint Arabic tinge. The view still held by most commentators is that the book is very ancient, and its author probably Moses. If so, then it is intelligible why there is a resemblance between expressions in Job and in Genesis. (See Gen. ii: 23, and Job ii: 5; Gen. iv: 21, and Job xxi: 12, xxx: 31; Gen. vi: 2, and Job i: 6.) Others place it about the time of Solomon or that of one of the succeeding kings; Renan says about 100 years before the Captivity. Others make it even later, believing that the personification of the evil spirit is of Persian origin (i: 6, 7, 12). The Talmud originated the view, since adopted by various Biblical critics, that the book is only a parable. But against this view may be quoted Ezek. xiv: 14, 20, and James v: 11.

Jobba. See NIGER.

Job's Comforter, a false friend, who takes, or seems to take, pleasure in attributing one's misfortunes to one's own course of action, while pretending to sympathize. Of course the allusion is to the severe rebukes administered to Job by his three friends, which forced him to exclaim, "Miserable comforters are ye all" (Job xvi: 2).

Job's Turkey, a supposititious fowl, mentioned in an old story, which represents the biped as extremely emaciated from a persistent effort to hatch out chicks from dead eggs. The expression occurs usually in the following phrase: "As poor as Job's turkey," meaning very poor; extremely emaciated; in dire poverty.

Job's Tears, a corn plant of India. It is a grass, sometimes rising to the height of eight feet, with the stout habit of maize, to which also it is botanically allied. The name is derived from the tear-like form of the hard, shining, bluish-white seeds, which are sometimes made into bracelets and necklaces, and are also an article of food. Though one of the worst of the cereals, it has become almost naturalized in Spain and Portugal.

Jocasta, wife of Laius, King of Thebes, and mother of Œdipus, whom she afterward married, not knowing that he was her son. On discovering the fact, she, in horror of the crime, hanged herself.

Jocelyn, Ada Maria, an English novelist; born in Aldershot, Sept. 7, 1860. She wrote "£100,000 Versus Ghosts" (1888); "A Distracting Guest" (1889); "The M. F. H.'s Daughter" (1889); "The Hunt Mystery" (1890); "Drawn Blank" (1891); "A Big Stake" (1892); "Only a Horse Dealer" (1892); "For One Season Only" (1893); "Pamela's Honeymoon" (1894); "Run to Ground" (1894); "A Dangerous Brute" (1895); "A Regular Fraud" (1896); "Juanita Carrington" (1896); "Only a Flirt" (1897); "Only a Love Story" (1897); "Lady Mary's Experiences" (1897); "Miss Rayburn's Diamonds" (1898); etc.

Jochebed, the wife of Amram, and mother of Moses, Aaron, and Miriam. She was a daughter of Levi, and her husband's aunt though such marriages were afterward prohibited. (Lev. xviii: 12.)

Jodhpur (jōd-pör′), a town of Hindustan, capital of the state of Jodhpur. It stands in a hollow inclosed by rocky eminences, on the highest of which is a fort, containing the Maharajah's palace, and

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commanding the city. The town has many handsome buildings, and is surrounded by a strong wall with 70 gates. The State of Jodhpur is the largest in Rajputâna, having an area of 37,000 square miles; it is well watered by the Luni and its affluents; and though arid in many parts raises in others good crops of wheat, barley, millet. Pop. (1901) State, 1,935,565; town, 60,437.

Jodrell, Richard Paul, an English dramatist and scholar; born in Derbyshire, Nov. 13, 1745. He wrote: "Seeing Is Believing" (1786), a good comedy; "The Persian Heroine" (1786), a good tragedy; and "Philology of the English Language" (1820), a good manual. He died in London, Jan. 26, 1831.

Joel, the name of a Hebrew prophet, and of more than 12 other persons mentioned in the Old Testament (I Sam. viii: 23; I Chr. iv: 35, v: 12, etc.

Joel, Book of, a prophetic book of the Old Testament, written by Joel, the second of the minor prophets. Nothing is known of him except that he was the son of Pethuel. Joel seems to have lived in Judah. The main object of his book is to counsel repentance, in connection with a fearful visitation of locusts, accompanied by drought, which had desolated the land (ch. i., ii: 1–12). Then there follows a prediction that the Spirit of God should be poured out on all flesh, with celestial revelations to young and old (ii: 28), a passage which St. Peter refers to as being fulfilled in the Pentecostal effusion of the Holy Ghost (Acts ii: 16–21).

The date of Joel is doubtful. He has been placed in the reign of Joash (878–838 B. C.), in that of Uzziah (809–756), in which case he was a contemporary of Amos, with whose prophecies several verses of Joel agree. (Cf. Joel i: 4, ii: 25 with Amos iv: 6–9; Joel iii: 4–6 with Amos i: 6–10; Joel iii: 16 with Amos i: 2, and ver. 18 with Amos ix: 13). Others suppose him to have lived in the reign of Joram (893 or 892–883–884 B. C.); or in that of Manasseh (699–644 B. C.). If there is a reference in Joel iii: 2 to the captivity of the 10 tribes, and in verse 1 to that of the two, this would indicate a late date, as the mention of the Grecians in verse 6 perhaps may do. The canonical authority of Joel has never been seriously disputed.

Joe Miller (from JOSEPH MILLER, 1684–1738, a witty actor, who was a favorite about the time Congreve's plays were fashionable), a stale jest. The compilation "Joe Miller's Jests," published a year after the death of the supposed author, was the work of John Mottley (1692–1750), but the term has been used to pass off, not only the original stock, but thousands of jokes manufactured long after Miller was buried in the churchyard of St. Clement Danes. Also a jest book, especially one in which the jokes are old, and the wit the reverse of sparkling.

Johannesburg, a town in the Transvaal, recognized as the central point of the gold fields of the district stretching S. W. from Pretoria to Potchefstrom, and known as the Witwatersrand. The streets and squares of the town are well laid out, and the buildings solid and substantial. Climate agreeable and healthy; winter nearly rainless, dust storms then prevailing. Founded in September, 1886, on a desolate plateau at the height of 5,600 feet above sea-level, it has grown with remarkable rapidity, and in 1904 the municipality had an area of 81¾ square miles, and a population of 155,642, of whom 83,363 (1908, 95,126) were whites. See RAND, THE.

Johannisberg, a village of Prussia, overlooking the Rhine. It has a hydropathic establishment and manufactories of pianos and printing presses, but is noteworthy chiefly for its castle (1722–1732), the property of the Metternich family. and the famous vineyards (38 acres) on the castle hill, producing the choice Johannisberger white wine.

John, the name of four men mentioned in the New Testament.

(1) John the Baptist, the forerunner of Christ, was the son of the priest Zacharias and Elizabeth, the cousin of Mary, the mother of our Lord. He was a Nazarite from his birth, and he prepared himself for his mission by years of self discipline in the desert until at length he appeared to startle his hearers with the preaching of repentance. The rite of baptism which he administered was a token and symbol of repentance and forgiveness of sins, preparatory to that baptism to follow, the distinctive quality of which was to be the gift of regeneration through the power of the Holy Spirit. With the baptism of Jesus the more especial office of the forerunner ceased, and soon after his ministry came to a close. He had fearlessly denounced Herod Antipas for taking Herodias, his brother Philip's wife, and was accordingly flung into prison, where ere long he was executed at the request of Salome, the daughter of the abandoned Herodias. The Mandæans or Zabians still claim to be his disciples.

(2) John the Apostle. His father was Zebedee (Matt. iv: 21), his mother Salome (Matt. xxvi: 56; Mark xv: 40, xvi: 1). His father was a fisherman who kept hired servants (Mark i: 20), and was therefore of some position. John was called with his brother James to follow Jesus (Matt. iv: 21). His nature was of that sensitive kind which is the temperament of genius, eloquence, passion, and love. In the first three Gospels he figures as Boanerges, or Son of Thunder (Mark iii: 17), and in the excess of his zeal he wished to call down fire from heaven on a village of the Samaritans because "they did not receive" Jesus (Luke ix: 54). In the 4th gospel the loving elements of his character alone appear. He was the disciple whom Jesus loved (John xx: 2). He was personally acquainted with Caiaphas, the high priest (John xviii: 15, 16, 19, 28). At the crucifixion the mother of Jesus was intrusted to his care, and he took her to his house (John xix: 27). With Peter he was early at the sepulcher (xx: 2–4). After the resurrection he remained at Jersalem for at least 15 years (Acts iii., iv:; see xv: 6 and Gal. ii: 9). Tradition asserts that he visited Rome, and was there, before the Latin Gate, plunged into a caldron of boiling oil, from which he was supernaturally

delivered, so that he was a martyr in will, though not in deed. The Roman Church commemorates this circumstance on May 6, under the title S. Johannes ante Portam Latinam. It is also said that when a poisoned chalice was given him he made the sign of the cross over it, and the poison fled from it in the form of an asp. At a later period he was banished to Patmos, where he saw the apocalyptic vision (Rev. i: 9). Tradition makes his last sphere Ephesus, where he died at an advanced age.

(3) A dignitary mentioned in Acts iv: 6.

(4) John Mark.

Christians of St. John, Disciples of John. —The first name was given by Europeans to, and the second assumed by, a Jewish sect, perhaps descended from the Hemerobaptists mentioned by early Christian writers. They are followers of John the Baptist rather than of John the Apostle. They live in Persia and Arabia, especially at Bassora, and are called by the Orientals Sabeans.

The Epistles General of John.— The first epistle: No name indicating authorship appears in the letter itself, but the style is that of the 4th gospel, and 35 passages are nearly the same in each. The external evidence for its genuineness and authenticity is very strong. Evidence in its favor is adducible from Polycarp, Papias as quoted by Eusebius, Origen, Clement of Alexandria, and Tertullian, and Eusebius ranked it among his homolegoumena, or books unanimously accepted. Scaliger (1484–1558) believed that it was not from the Apostle, and was followed by Lange and the Tübingen school; but the general opinion of Christians is strongly in its favor. Its date has been fixed between A. D. 70 and 96 or 100, the last being the most probable. The epistle treats of love. The definition "God is love" is from iv: 16. Its opening looks like an assault upon the doctrine of the Docetæ. The verse (v: 7) concerning the heavenly witnesses is considered an interpolation.

The second epistle: It is written by "the elder" to "the elect lady and her children." The external evidence for it is much weaker than that for the 1st epistle, and Eusebius placed it among the antilogoumena, or books not universally accepted. Its theme, like that of the 1st, is love, but love does not require heretics to be entertained.

The third epistle: This was addressed by "the elder" to "the well-beloved Gaius." The domineering Diotrephes is censured, Demetrius commended. In point of evidence it stands like the 2d epistle.

The Gospel According to John.—The 4th Gospel, and distinct from the others in various respects. They record chiefly the ministry to Jesus in Galilee; it treats of His labors in Jerusalem. While they chiefly illustrate His humanity, it gives special prominence to His divinity. But there are resemblances too. The family of Bethany figures in Luke x: 38–42, as well as in John: the last Gospel records the feeding of the 5,000 (John vi: 5–13), as do the others (Matt. xiv: 15–21, Mark vi: 35–44, Luke ix: 10–17). So also the crucifixion and the resurrection are recorded in them all.

The author of the book of John was well acquainted with the topography of Jerusalem (v: 2, ix: 7), and with the Jewish feasts, which he carefully records (ii: 13, vii: 2, x: 22, etc.). His Greek is of a Hebraic type, though not so much so as that of the Apocalypse. As the author tells more than any of the other three evangelists what passed within the apostolic circle, presumably he was himself an apostle. The book itself does not name its author; the nearly uniform voice of antiquity assigned it to John. In modern times there has been serious controversy on the subject, rationalists maintaining that it was penned too late in the 2d century to have emanated from John, who, at latest, cannot have lived beyond A. D. 100. The large majority of theologians, however, consider it of earlier date. On the one hand Papias, as quoted by Eusebius, does not seem to have known it, though he was Bishop of Hieropolis, near Ephesus, where it is believed to have been first published. On the other hand, there are abundant testimonies to it in the latter half of the 2d century. Thus, Tatian (166–171) quotes it often, and Irenæus, Bishop of Lyons, from about 177, does so 80 times; also perhaps Justin Martyr refers to it about A. D. 150, 138 or 139, or 147, and again in 161; possibly Barnabas and Ignatius earlier. If in the latter half of the 2d century the knowledge of it was so widely diffused, there must have been a prior period during which acquaintance with it must have been spreading from a center. Hilgenfeld, a rationalistic writer (1875), is willing to grant it as early a date as 132 to 140, and another one, Keim (1875), as 130 A. D. But in 1868 Prof. Hofstede De Groot, of Gromingen, in Holland, cited from Hippolytus a statement that the gnostic Basilides, whose exact date had been unknown, had a communication from Matthias the Apostle, whom he personally knew. If so, he lived in the 1st century, and he undoubtedly quotes the Gospel by John. If Hippolytus' statement is correct, then the Gospel by John is undoubtedly a production of the apostolic era.

John, a name borne by 23 Popes who reigned in the following order:

John I.....523-526	John V.....685-686
John II.....533-535	John VI.....701-705
John III.....560-573	John VII.....705-707
John IV.....640-642	John VIII.....872-882

John IX.....898-900	John XVI. (anti-pope) 997
John X.....914-928	John XVII.....1003
John XI.....931-936	John XVIII..1003-1009
John XII.....956-964	John XIX....1024-1033
John XIII.....965-972	John XX.....1042-1046
John XIV.....983-985	John XXI....1276-1277
John XV.....985	John XXII...1316-1334
John XVI.....985-996	John XXIII..1410-1415

The following only have an historical importance:

JOHN I. was a native of Tuscany, and ascended the papal chair on the death of Hormisdas in 523. Theodoric, King of the Goths, a violent Arian, threw him into prison at Ravenna, where he died in 526. The Roman Catholic Church honors him as a martyr.

JOHN VIII., a Roman, was elected to the pontificate on the death of Adrian II., in 872. He crowned the Emperor Charles the Bald in 875, and three years after went to France, where he held a council at Troyes. In his time Italy was ravaged by the Saracens, who obliged the Pope to pay tribute. He corresponded with Photius, patriarch of Constantinople, who had driven Ignatius from his seat and usurped the dignity. John, imposed on by the pretenses of the intruder, acknowledged him patriarch; but, on discovering his error, he excommunicated him. He died in 882.

JOHN XI. was made Pope at the age of 25, in 931, through the influence of his mother Marozia, wife of Guy, Duke of Tuscany; but his brother Alberico afterward threw both him and her into the castle of St. Angelo, where John died in 936.

JOHN XII., the son of Alberico, and originally called Octavian; born 938. He was elected Pope in 956, and was the first who changed his name on that occasion. At that time Berenger tyrannized over Italy, and the Pope implored the assistance of the Emperor Otho I., who delivered the country. John crowned Otho at Rome, and promised him fidelity, which, however, was of short duration, for he united with the son of Berenger against his deliverer. Otho returned to Rome in 963, and called a council, in which the Pope was accused of sacrilege and other crimes, which being proved, he was deposed. On the departure of the emperor, John entered Rome and exercised dreadful cruelties on his enemies. He died in 964, under very suspicious circumstances.

JOHN XXII. (JAMES D'EUSE), a native of Cahors, who by the patronage of Charles II. of Naples, to whose son he was preceptor, rose to high ecclesiastical dignities, and in 1316 was elected Pope. He was an active pontiff, and founded several abbeys, and established some bishoprics in central towns. His pontificate, however, was disturbed by various quarrels, especially with the Cordeliers, whose order he intended to suppress. He died 1334, respected for his frugality, prudence, and sanctity. He was well skilled in medicine and wrote medical works.

JOHN XXIII. (BALTHASAR COSSA), a Neapolitan who was legate at Bologna, and chamberlain to Boniface IX., and succeeded Alexander V., 1410. His elevation was not without opposition; but to pacify faction, he promised to resign the tiara if Gregory XII. and Peter de Lune, or Benedict XIII., would also abandon their pretensions. Though these conditions were accepted and ratified with due formality in the council of Constance, he had the art to withdraw himself and to reassume the office and insignia of sovereign pontiff; but he was soon after deposed and imprisoned. Three years after, 1418, he was restored to liberty, and compelled to acknowledge the election of Martin V., by whom he was treated with great kindness. He died soon after, 1419.

John, King of England; born in Oxford in 1166, was the youngest son of Henry II. by Eleanor of Guinne. Ireland being intended for him, he was sent over, in 1185, to complete its conquest, but such was his

JOHN XII.

imprudence that it was found necessary to recall him; and on the death of his father he was left without any provision, which procured for him the name of *Sans Terre,* or Lackland. His brother Richard, on coming to the throne, conferred on him the earldom of Mortaigne, in Normandy, and various large possessions in England, and married him to the rich heiress of the Duke of Gloucester. Notwithstanding this kindness, he had the ingratitude to form intrigues against Richard, in conjunction with the King of France, during his absence in Palestine; but Richard magnanimously pardoned him, and at his death left him his kingdom in preference to Arthur of Brittany, the son of his elder brother, Geoffrey. Some of the French provinces, however, revolted in favor of Arthur; but

John ultimately recovered them, and his nephew was captured and confined in the castle of Falaise, whence he was subsequently removed to Rouen and never heard of more. Being suspected of the murder of Arthur, the states of Brittany summoned John to answer the charge before his liege lord, King Philip; and upon his refusal to appear the latter assumed the execution of the sentence of forfeiture against him; and thus, after its alienation from the French crown for three centuries, the whole of Normandy was recovered. A quarrel with the Pope Innocent III., who had nominated Stephen Langton to the see of Canterbury, added to the perplexity of the king, whom the Pope excommunicated, and whose subjects he formally absolved from their allegiance. At length John was induced not only to receive Langton as Archbishop of Canterbury, but to resign his kingdom to the holy see, in order to receive it again as its vassal. John had by this time rendered himself the object of such universal contempt and hatred that his nobles determined, if possible, to limit his power and establish their privileges; and though the Pope declared his disapprobation of their conduct, the barons assembled in arms at Oxford, where the court then was, and immediately proceeded to warlike operations. They were received without opposition in London, which so intimidated the king that he consented to whatever terms they chose to dictate. Thus was obtained that basis of English constitutional freedom known as "Magna Charta," which not only protected the nobles against the crown, but secured important privileges to every class of freemen. But while the monarch appeared to be all-complying and passive, he was secretly purposing to annul the charter. The Pope pronounced a sentence of excommunication on all who should attempt to enforce it; and John, having collected an army of mercenaries, carried war and devastation throughout the kingdom. The barons, taken by surprise, now sent a deputation to Philip of France, offering the crown of England to the dauphin Louis; who speedily, with 600 vessels, landed at Sandwich and proceeded to London, where he was received as lawful sovereign. John was immediately deserted by all his foreign troops and most of his English adherents; but the report of a scheme of Louis for the extermination of the English nobility arrested his progress, and induced many to return to their allegiance. While the king's affairs were beginning to assume a better aspect, he was taken ill, and died in Newark in 1216.

John, the name of various European monarchs.

FRANCE.

JOHN I., King of France, a posthumous son of Louis X.; born and died in 1316.

JOHN II., surnamed the Good, a king of France, son of Philip VI.; born in 1319, and succeeded his father in 1350. In 1356 he was taken prisoner by Edward the Black Prince at Poitiers and carried to England. After the treaty of Bretigny (1360) he returned home, leaving his eldest son, the Duke of Anjou, as hostage, till he should fulfil the terms of his ransom. But in the meantime the duke escaped back to France. John, however, chivalrously kept his word, and returned to London early in 1364; but he died on April 8 in that same year without having regained his freedom. His eldest son, Charles V., succeeded him.

EASTERN EMPIRE.

JOHN I., Emperor of Constantinople, surnamed Zimisces, was of an illustrious family. He succeeded the emperor Nicephorus Phocas in 969, and obtained many victories over the Russians, Bulgarians, and Saracens. He was poisoned by Basil the Eunuch in 976.

JOHN II., COMNENUS, succeeded Alexis Comnenus, his father, in 1118. He gained several battles over the Turks and Servians, and governed with great prudence and liberality. He died in 1143 of a wound which he received from a poisoned arrow.

JOHN III., DUCAS, was crowned at Nicea in 1222, at the time when the Latins were in possession of Constantinople. He was a prince of great virtue, gained many battles, defeated the Scythians, Tartars, and Bulgarians, and extended his empire on all sides. He died in 1255.

JOHN IV., LASCARIS, son of Theodore the Young, whom he succeeded in 1259 at the age of six years; but in the same year the despot Michael Palæologus deprived him of his crown and his eyes, and imprisoned him for life. He died in 1284.

JOHN V., PALÆOLOGUS, succeeded his father, Andronicus the Younger, in 1341, but his throne was for a long period usurped by John Cantacuzenus, whose daughter he married after recovering his throne. His son Andronicus revolted against him, and the Genoese made themselves masters of the isle of Lesbos, and Amurath I. took the city of Adrianople. He died in 1391.

JOHN VI., CANTACUZENUS, was the minister and favorite of Andronicus Palæologus, who made him guardian of his children, John and Emanuel, with whose mother, Jane of Savoy, he governed for some time with great wisdom and moderation. But, in 1345 he assumed the imperial title in Thrace, and in 1347 took Constantinople, compelling John Palæologus, who had been crowned in 1341, and who had married his

daughter, to retire to Salonica. The exiled monarch, however, with the help of the Genoese, defeated the fleet of the usurper, and obliged him to quit his throne and capital. He then retired to the monastery of Mount Athos, where he devoted himself to literary studies and wrote a valuable history of the empire and a defense of Christianity against the Mohammedans.

JOHN VII., PALÆOLOGUS succeeded his father Emanuel in 1425. His reign was very unfortunate, and the Turks made such progress in his dominions as to reduce him to the necessity of imploring the succor of the Latins. He consented to a union of the two churches, which was performed at the council of Ferrara, in 1439, at which John assisted in person. He died in 1448.

PORTUGAL.

JOHN I., King of Portugal, was the natural son of Peter, and in 1383 ascended the throne, to the prejudice of Beatrice, daughter of Ferdinand I., his brother. John I., King of Castile, the husband of that princess, disputed the crown, but was defeated at the battle of Aljubarota in 1385. He then turned his arms against the Moors of Africa and took Ceuta and other places. He died in 1433.

JOHN II., surnamed the Great, and born in 1455, succeeded his father, Alphonsus V., in 1481. He was successful in his suppression of some insurrections, and afterward he carried his arms into Africa and was at the taking of Arzile and Tangiers. He afterward defeated the Castilians at the battle of Toro, 1486, and with wise policy encouraged the maritime excursions of his subjects and favored their settlements on the coasts of Africa and in the Indies. He died in 1495.

JOHN III. succeeded his father, Emanuel, 1521. The beginning of his reign was marked by dreadful earthquakes; but John, with benevolence and wisdom, relieved the miseries of his subjects and encouraged commerce and navigation. His fleets penetrated far into the East and discovered Japan; and to insure the tranquillity of his Indian settlements he sent among them the celebrated Francis Xavier. He died in 1557, deservedly respected as a humane and enlightened monarch.

JOHN IV., surnamed the Fortunate; born in 1604, was the son of Theodore, Duke of Braganza. He employed all the powers of his mind and of his situation to the emancipation of his country, which the Spaniards, after the death of Sebastian, had conquered and since held as a tributary province, and by the assistance of his brave countrymen he shook off the odious yoke, and was proclaimed king, 1630. He died in 1636.

JOHN V. succeeded Peter II, 1707. He espoused the cause of the allies in the wars of the Spanish Succession, and when the peace of Utrecht, in 1713, restored tranquillity to Europe, he devoted himself to the encouragement of commerce, of literature, and of industry among his subjects. He died in 1750.

JOHN VI., second son of Peter III., was appointed regent when his mother, Maria I., lost her reason in 1799. In 1817 he was driven by the French from Portugal, whereupon he took up his residence in Brazil with the title of emperor. On the death of his mother in 1816 he was proclaimed king, but did not return to Portugal till 1821. In 1823 French intervention again destroyed the hopes of the constitutional party in Portugal. The independence of Brazil was recognized in 1825, and the king died in 1826.

CASTILE AND LEON.

JOHN I., King of Castile and Leon, succeeded his father, Henry II., in 1379, at the age of 21 years. He made war on Portugal for the purpose of placing his son on the throne of that country, but was unsuccessful. He was surnamed "Father of his Country," for his generous and just rule of his kingdom. He died in 1390.

JOHN II.; born in 1405; was son of Henry III., and was proclaimed king when less than two years of age, his uncle Ferdinand being appointed regent. He made war successfully against the kingdoms of Aragon and Navarre, and the Moors of Granada. He greatly assisted in the restoration of Spanish literature, and was father of the celebrated Isabella and Henrique IV. He died in 1454.

ARAGON.

JOHN I., King of Aragon, succeeded his father, Peter IV., in 1387. Throughout his reign he was continually at hostilities with his subjects, whom he governed with great injustice and severity.

JOHN II., son of Ferdinand the Just, ascended the throne of Navarre on marrying Blanche, daughter of Charles the Noble, in 1425, and that of Aragon in 1458, after the death of Alphonsus, his brother. He was for a long time at war with his son Don Carlos, to whom Blanche, his mother, had left the crown of Navarre at her death in 1441. He died in 1479, leaving the kingdom to his son Ferdinand the Catholic.

BOHEMIA.

JOHN, King of Bohemia, the son of the Emperor Henry VII., was elected to the throne in 1310, at the age of 15. He was a warlike prince, and, after defeating the Lithuanians, assumed the title of King of Poland. He lost an eye in that expedition, and a Jewish doctor, who pretended to re-

store him to sight, deprived him of the other. His military spirit, however, continued unabated, and he accompanied Philip of France, in 1346, to the battle of Cressy, where he was guided between two brave knights, each holding his bridle. He fell in that action, and was buried at Luxembourg.

JOHN III. (JOHN SOBIESKI), King of Poland, was youngest son of James Sobieski, governor of Cracow, and educated at Paris. In 1665 he was made grand marshal and general of the Polish armies, after which he was appointed master of the Royal House and prelate of Cracovia. He retook several cities from the rebellious Cossacks of the Ukraine, and distinguished himself in many gallant actions. In 1673 he gained the memorable battle of Choczim, near the Dniester, in which the Turks lost 28,000 men. On the death of Michael in the following year he was elected King of Poland, and shortly afterward compelled the Turks to sue for peace. In 1683 he forced them to raise the siege of Vienna, which otherwise would inevitably have been taken. He died in Warsaw, 1696.

BRITTANY.

JOHN, Duke of Brittany. Six princes of this name have worn the ducal crown, but only two are important: JOHN IV.— commonly known as John de Mortfort,— whose cause was espoused by the English. When made prisoner by the French, he had his rights vigorously maintained by his heroic wife, who bravely held out her castle against the large force that encompassed it till the arrival of the English fleet with troops to her aid compelling the enemy to raise a fruitless siege. JOHN VI., who, for the aid he afforded the English in their expedition under Henry V., was attacked by the Duke of Penthièvre, who drew him into an ambuscade, and making him a prisoner, kept him in confinement for five years. His government, after he regained his liberty, was marked by weakness and indecision. He died in 1442.

JOHN, the FEARLESS, Duke of Burgundy and Count of Nevers, succeeded his father in 1404, at the age of 33. The houses of Burgundy and Orleans at that period disputed the government of France, during the insanity of Charles VI. In 1407 he caused the assassination of the Duke of Orleans and by that act became absolute master in Paris; but it was also the commencement of the fearful internal struggle between the Burgundians and tne Armagnacs. Being reconciled with the dauphin, afterward Charles, he was assassinated in his presence by one of his courtiers in 1419.

John, Knights of. See HOSPITALLERS.

John Adams, The, a United States sloop-of-war, commanded by Capt. Charles Morris, who, in order to prevent her being captured by a British fleet, in August, 1814, burnt her in the Penobscot river, after transferring her guns to a battery on shore at Hampden.

John B. Stetson University, a coeducational institution in De Land, Fla.; chartered in 1886 under the auspices of the Baptist Church as De Land University, in honor of H. A. De Land, its founder; name changed as at present in 1887, in honor of a liberal benefactor; has endowment of about $285,000; grounds and buildings valued at over $305,000; average faculty, 50; average students, 580.

John Bull, a collective name, used in a sportive manner in order to designate the English people. It was first employed by Dean Swift. Among the English themselves the term is used in order to convey the idea of an honest, blunt, but, on the whole, good natured character. Among foreigners the term "John Bull" is employed in order to express the insular peculiarities and prejudices of the English nation, and especially their inability to accommodate themselves to the circumstances of foreign countries.

John Doe, a name formerly given to the fictitious lessee of the plaintiff in the mixed action of ejectment, that of the fictitious defendant being "Richard Roe."

"But if the lessor made out his title in a satisfactory manner, then judgment and a writ of possession were awarded to John Doe, the nominal plaintiff, who by this trial had proved the right of John Rogers, his supposed lessor."— Blackstone.

John Hircanus, son of Simon Maccabæus, whom he succeeded as high priest and prince of the Jews, 135 B. C.; died after a reign of 29 years, distinguished by his victories and reforms, 106 B. C.

John of Austria, or **Don John,** a Spanish soldier; the natural son of the Emperor Charles V.; born in Ratisbon, Bavaria, Feb. 24, 1547. He was brought up in such ignorance of his birth that, till summoned by Philip II., his brother, to Spain — to whom Charles had revealed the fact on his death bed — and there acknowledged as the emperor's son, he had been in total darkness as to who his parents were. His first most illustrious triumph was a victory over the Turkish galleys in the Gulf of Lepanto, in which the Ottomans lost 30,000 men; he next invaded Tunis, and in 1576 was sent by Philip as governor of the Low Countries, then in open revolt, under command of the Prince of Orange and the Archduke Matthias; here, in a succession of splendid victories, he so reduced his antagonists that the country must soon have submitted and returned to its allegiance, had he not been, unfortunately for the duration of the Span-

ish rule, suddenly carried off by poison, near Namur, Belgium, Oct. 1, 1578.

John of Gaunt, DUKE OF LANCASTER, 3rd son of Edward III.; born June 24, 1340, in Ghent. In 1359 he married Blanche, heiress of the duchy of Lancaster, and himself was created duke in 1362. Three years after her death he married in 1372 Con-

JOHN OF AUSTRIA.

stance, daughter of Pedro the Cruel of Castile, and assumed the title of King of Castile, though the country and crown were seized and held by Henry of Trastamare. The military expeditions which John organized against his rival all proved unsuccessful. Toward the close of his aged father's reign John gradually became the most influential personage in the realm. The young King Richard contrived to send him away on an expedition for the recovery of his crown in Spain. On this occasion John concluded a definite peace with Henry of Trastamare, in virtue of which John's daughter Catharine should succeed as queen of Castile. On his return to England after three years' absence he was able to reconcile the young king to his (John's) brother Thomas of Woodstock, Duke of Gloucester. After this Richard II. seems to have reposed more confidence in John, for he made him Duke of Aquitaine and intrusted him with several embassies to France. But John of Gaunt gradually ceased to be a factor in English politics and died in London, England, Feb. 3, 1399.

John o' Groat's House, in Caithness, Scotland, was, according to tradition, an octagonal building with eight doors and windows and an eight-sided table within, built by John o' Groat to prevent dissensions as to precedence among the eight different branches of his family. Whatever the origin of the legend, which resembles that of the Round Table, it is certain that between 1496 and 1525 there was one "John o' Groat of Duncansbay, baillie to the Earl in those pairts," and probably a Hollander.

John Strange Winter. See STANNARD, HENRIETTA, E. V. P.

John the Baptist. See JOHN.

John's, Eve of St., one of the most joyous festivals of Christendom during the Middle Ages, celebrated on midsummer eve. From the account given of it by Grimm it would appear to have been observed with similar rites in every country of Europe. Fires were kindled chiefly in the streets and market places of the towns; sometimes they were blessed by the parish priest, but as a rule they were secular in their character. The young people leaped over the flames, or threw flowers and garlands into them, with merry shoutings, songs, and dances. In England the people on the eve of St. John's went into the woods and broke down branches of trees, which they brought to their homes and planted over their doors, to make good the prophecy respecting the Baptist, tnat many should rejoice in his birth. It was a lingering belief of the Irish peasantry that the souls of all people on this night leave their bodies and wander to their ultimate place of death by land or sea.

Johns Hopkins University, an American educational institution in Baltimore, Md.; incorporated in 1867, during the lifetime of the founder, but not formally opened till 1876, after his death. Johns Hopkins left the greater part of his fortune to the university, the endowment of which is over $4,560,000. The hospital maintained in connection with the institution is equally liberally endowed. Post-graduate study forms the leading feature of the course of instruction, though other courses are given. The buildings of the university are in the center of the city. They include McCoy Hall, in which are the library, assembly room and rooms appropriated to special studies; Levering Hall, the building of the Young Men's Christian Association; Hopkins Hall, equipped for the study of geology and mineralogy; a chemical laboratory; a biological laboratory; a physical laboratory; a gymnasium; an administration building; and a medical school, housed in the hospital and in an annex. Connected with the university is likewise a thriving press, from which issue "American Journal of Mathematics"; "American Chemical Journal"; "American Journal of Philology"; "Studies from the Biological Laboratory"; "Studies in Historical and Political Science"; "Journal of Experimental Medicine"; "Beiträge zur Assyriologie,"; "Modern Language Notes"; "Johns Hopkins University Circulars"; etc.

The president, aided by a board of 13 trustees, and an academic council of nine, comprise the governing body. The degrees of Bachelor of Arts, Doctor of Philosophy and Doctor of Medicine are conferred. Advanced and graduate students have elective courses, but each instructor has a discretion of his own with regard to admission to his classes. The university has an endowment of over $4,560,000; grounds and buildings valued at over $1,700,000; scientific apparatus, etc., $250,000; volumes in the library, about 145,000; ordinary income, about $340,000; average number of faculty, 200; average students, 730; graduates, over 2,400.

Johnson, Andrew, an American statesmen, 17th president of the United States; born in Raleigh, N. C., Dec. 29, 1808. At 10 years of age he was indentured to a tailor, for whom he worked for seven years, receiving no schooling, but was taught to read by a fellow-apprentice. In 1826, with

ANDREW JOHNSON.

his mother, he emigrated to Tennessee. Here he married Eliza McCardle, a woman of good education, who instructed him in writing and other accomplishments. He was three times elected alderman, and then mayor in 1828–1830. In 1835 and in 1839 he was sent to the Tennessee Legislature. In 1840 he made campaign speeches for Van Buren that gave him a wide reputation for oratory. In 1843 he was elected to Congress, and reëlected in 1845, 1847, 1849, and 1851. In 1853 Tennessee was "gerrymandered" to prevent his election, whereupon he ran for governor and was elected. In 1857 he was sent to the United States Senate, where he ably advocated and secured the passage of a homestead bill which President Buchanan vetoed. He ardently advocated the Union cause, and was made military governor of Tennessee by Lincoln in 1862, where he gave vigorous support to the Federal government. In 1864 he was elected Vice-President, with Lincoln, and on the

assassination of Lincoln, in April, 1865, became President by succession. His administration was marked by constant dissension between himself and Congress, and he was impeached before that body for resisting the execution of the acts of Congress and various alleged "high crimes and misdemeanors." The trial was presided over by Chief Justice Salmon P. Chase. A two-thirds vote necessary to convict could not be secured, and the trial failed (May 16, 1868). A change of one vote, however, would have carried conviction. When his term expired he retired to Tennessee, and in 1875 was elected to the United States Senate, but died July 31, of that year.

Johnson, Bushrod Rust, an American military officer; born in Belmont co., O., Oct. 7, 1817. He was graduated at the United States Military Academy in 1840. He saw service in the Florida and Mexican Wars, but resigned his commission in 1847 and was made professor in the Western Military Institution of Kentucky, at Georgetown. He entered the Confederate army as a Brigadier-General at the commencement of the Civil War, and in 1864 became a Major-General. He commanded a division under General Lee till the surrender at Appomattox Court House. He was afterward appointed Superintendent of the Military College in the University of Nashville, and chancellor of that institution. He died Sept. 11, 1880.

Johnson, Charles Frederick, an American author; born in New York city in 1836. He was graduated at Yale in 1855; became Professor of English Literature at Trinity College, Hartford, Conn., in 1883. His works include "Three Americans and Three Englishmen" (1886); "English Words"; "English and American Literary History"; etc.

Johnson, Eastman, an American painter; born in Lovell, Me., July 29, 1824. In 1849 he went to Düsseldorf, where he studied two years, and afterward resided for four years at The Hague, where, besides numerous portraits, he executed "The Savoyard" and the "Card Players," his earliest elaborate pictures in oil. After visiting the principal European galleries he returned to New York in 1856. His favorite subjects are the American rustic and negro, and glimpses of domestic life, though later he devoted himself almost exclusively to portrait painting. He revisited Europe in 1885. Among his best works, many of which have been reproduced in chromo-lithography are "The Old Kentucky Home" (1859); "Mating" (1860); "The Farmer's Sunday Morning" (1860); "The Village Blacksmith" (1864); "Fiddling his Way" (1865); "The Boyhood of Abraham Lincoln" (1867); "The Barefoot Boy" (1868); "The Old Stage Coach" (1871);

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"The Wounded Drummer" (1872); "The Pedlar" (1873); "Dropping Off" (1873); "A Glass with the Squire" (1880); and "The Funding Bill" (1881). He painted portraits of many notabilities. He died April 5, 1906.

Johnson, Emily Pauline (Tekahionwake), a Canadian poet; born in the Six Nations Reserve, Canada. She is of Indian descent. Her first volume of verse was "The White Wampum" (1894). Her first sketch, "A Red Girl's Reasoning," took a prize in the "Canadian Magazine."

Johnson, Helen Kendrick, an American author; born in Hamilton, N. Y., Jan. 4, 1843. She received an academic education and in 1869 married Rossiter Johnson. She is the author of "The Roddy Books," "Woman and the Republic," and "Raleigh Westgate." She edited "Tears for the Little Ones: Poems and Passages Inspired by the Loss of Children"; "Poems and Songs for Young People"; "Our Familiar Songs"; etc.

Johnson, Oliver, an American editor; born in Peacham, Vt., Dec. 27, 1809. He was editor of the "Independent" from 1865 to 1870; became editor of the "Christian Union" in 1872; was one of the founders of the New England Anti-Slavery Society in 1832; and published "William Lloyd Garrison and his Times" (1880). He died in Brooklyn, N. Y., Dec. 10, 1889.

Johnson, Reverdy, an American lawyer and statesman; born in Annapolis, Md., May 21, 1796; was admitted to the bar in 1815. In 1821 he was elected State senator and reëlected in 1825. In 1845 he was chosen United States senator, and in 1849 was appointed by President Taylor, attorney-general. In 1868, he was appointed United States minister to the Court of St. James, where he negotiated a treaty for the settlement of the "Alabama" claims, which the United States rejected. He died in Annapolis, Feb. 10, 1876.

Johnson, Richard W., an American military officer; born near Smithland, Ky., Feb. 7, 1827. He was graduated at United States Military Academy in 1849. From 1855 to 1861 he was engaged in campaigns against the Indians. On the outbreak of the Civil War he was made Brigadier-General of volunteers. At the end of hostilities he retired with the rank of Major-General for wounds received but under a subsequent law of Congress, which retired officers on the rank actually held when disabled, he was reduced to the rank of Brigadier-General. He held professorship of military science at leading universities after his retirement. He died in St. Paul, Minn., April 21, 1897.

Johnson, Robert Underwood, an American poet and editor; born in Washington, D. C., Jan. 12, 1853; became associate editor of the "Century Magazine." His efforts in behalf of the establishment of international copyright were recognized by the degree of M. A., conferred by Yale University in 1891. He edited, with C. C. Buel, the notable "Battles and Leaders of the Civil War" (1887–1888), and has published two volumes of poems.

Johnson, Rossiter, author and editor, born in Rochester, N. Y., Jan. 27, 1840. He was graduated at the University of Rochester; was associate editor of the Rochester "Democrat" (1864-68); editor of the Concord, N. H., "Statesman" (1869-72); and associate editor of the "American Cyclopædia" (1873-77). He devised and edited the series of "Little Classics" (1874-75), and edited many other anthologies and books of reference. His original works include "Phaeton Rogers" (1881), "The End of a Rainbow" (1892), "History of the War of 1812" (1882), "History of the War of Secession" (1888), "Story of the Constitution of the United States" (1906), "The Alphabet of Rhetoric" (1903), and "Morning Lights and Evening Shadows," poems (1902). He received the degrees of Ph.D. and LL.D.

Johnson, Samuel, an English writer, born in Lichfield, where his father was a bookseller, Sept. 18, 1709. He inherited a robust body and active mind, together with a scrofulous taint which impaired his sight and hearing, and a strong disposition to morbid melancholy. He also derived from the same source a marked attachment to High Church principles, and a decided predilection for the family of Stuart. He showed great precocity, and after a short period at a dame school he began the study of Latin in the free school of Lichfield. He afterward spent a year in a school at Stourbridge in Worcestershire, and, on returning, remained two years at home. Having acquired reputation from his exercises, particularly of the poetical class, a neighboring gentleman of the name of Corbet offered to maintain him at Oxford as companion to his son. He was accordingly entered in Pembroke College in 1728, being then in his 19th year. A disagreement with his benefactor led to the stopping of his supplies after some time, and it would appear that he showed no very great interest in the college studies. He resided continuously for over a year, and for a few short periods thereafter, his name being removed from the books about three years after his admission. Still, he acquired credit by occasional poetical compositions in the Latin language, and especially by a translation of Pope's "Messiah," which was printed in 1731 in a college publication, but, after all, left Oxford without taking a degree. About this time, according

to his own account, he received a strong religious impression from the perusal of Law's "Serious Call to a Devout and Holy Life." Soon after his return to Lichfield his father died when on the verge of bankruptcy, and poverty compelled Johnson to seek for some situation as teacher. In 1732 he received an appointment as usher at the grammar school of Market Bosworth. His impatience under the haughty treatment of the principal induced him to quit this situation after a few months; and he passed some time as a guest with a schoolfellow who was lodging in Birmingham with the publisher of the Birmingham "Journal." He contributed to that newspaper, besides executing other literary work, including a translation from the French of Father Lobo's "Travels in Abyssinia."

Returning to Lichfield he published proposals for the republication of the poems of "Politian," with a life, and a history of modern Latin poetry, which prospectus was but little attended to. Disappointed in this scheme he offered his services to Cave as a contributor to the "Gentleman's Magazine," which, however, was but a slight step toward a maintenance; and in 1735 he sought to improve his condition by a marriage with Mrs. Porter, the widow of a mercer, to whom he had been introduced by the schoolfellow already referred to. Her fortune of £800 was a dowry of some moment to a suitor in the situation of Johnson, and the fact of her being twice his own age and possessed of little personal attraction or refinement, renders his subsequent description of this union as a "love match on both sides" the more extraordinary. He now rented a large house in Edial, near Lichfield, with a view to take pupils and boarders, but the plan did not succeed and after a year's trial he resolved to seek his fortune in London, in company with one of his few pupils, the celebrated David Garrick. In March, 1737, the two adventurers accordingly arrived in the metropolis, Johnson with his unfinished tragedy of "Irene" in his pocket, and with little to depend on but his slender engagement with Cave. At this time he became acquainted with the reckless and unfortunate Savage, and in some respects his personal conduct was unfavorably affected by the intimacy; but from irregularity of this nature he was soon recovered by his deeply grounded religious and moral principles. His first literary production which attracted notice in the metropolis was his "London, a Poem," in imitation of the third satire of Juvenal. He soon after made an attempt to obtain a Dublin degree of M. A., through a recommendation to Swift, in order to obtain the mastership of a free grammar school in Leicestershire, but could not succeed.

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His engagement in the "Gentleman's Magazine" led to a new exercise of his powers in the composition of parliamentary debates, which, being then deemed a breach of privilege, were published under the fiction of "Debates in the Senate of Lilliput." The extraordinary eloquence displayed in these productions was almost exclusively the product of his own invention; but it is probable that he adhered more faithfully to the tenor of the arguments of the real speakers than to their language. He, however, confesses himself that he "took care the Whig dogs should not have the best of it." His attachment to the Jacobites was also further manifested by the composition of a humorous pamphlet in 1739 entitled the "Marmor Norfolciense," consisting of a supposed ancient prophecy, in Latin monkish rhymes. For some years longer the "Gentleman's Magazine" received the chief of his attention. For this miscellany he composed several excellent biographical articles and in 1744 published his celebrated "Life of Savage" separately. In 1747 after a number of abortive projects he sent out his plans for an English "Dictionary," in an admirably composed pamphlet, addressed to the Earl of Chesterfield, who, however, concerned himself very little in the success of the undertaking. The time that he could spare from this compilation, which has been justly accounted a wonderful exertion of industry, was allotted to various literary avocations. In the same year he furnished Garrick with his admirable prologue on the opening of Drury Lane theater; and in 1749 published another admired imitation of Juvenal, which he entitled the "Vanity of Human Wishes." In the same year his tragedy of "Irene" was produced at Drury Lane theater under the auspices of Garrick. It was performed 13 nights with but moderate applause, and Johnson, satisfied that he was not formed to excel in the drama, wisely gave up the endeavor.

In March, 1750, appeared the first paper of the "Rambler," the gravity of the tone of which, notwithstanding its acuteness of observation, richness of illustration, and dignity of expression, prevented it from obtaining a wide circulation as a periodical paper, though when collected into volumes the author himself lived to see it reach a 10th edition. A short time before the appearance of the "Rambler," half deluded by his political dislike of Milton, he hastily adopted the imposture of Lauder, in his attempt to fix the charge of plagiarism on that great poet. When undeceived, however, he insisted on Lauder's signing a formal recantation, and, possibly as some atonement, wrote a prologue to "Comus," when acted for the benefit of Milton's granddaughter. In the year 1755 was published his long

expected "Dictionary," to which his name appeared with the degree of M. A., obtained from the University of Oxford by the good offices of Mr. Warton. The approaching publication of this work Lord Chesterfield had favorably announced some months before in two papers to the "World," but Johnson, conscious of having received no sort of support or encouragement from that nobleman during its progress, addressed to him a well-known letter replete with pointed sarcasm and manly disdain. The "Dictionary" was received by the public with very general applause; and though its neglect of the Northern etymologies, and the defects rendered apparent by more recent research have somewhat lessened its original reputation, it still remains the basis of works of the kind in the English language. In its progress, however, this great work had done nothing beyond merely supporting him; and it appears from an arrest for a very trifling sum in the year subsequent to its publication that his necessities continued undiminished. An edition of Shakespeare, the "Idler," with occasional contributions for a literary magazine, formed the desultory occupation of several succeeding years.

In 1759 he wrote his celebrated romance of "Rasselas, Prince of Abyssinia," which fine performance he composed in the evenings of one week in order to defray the funeral expenses of his aged mother. At length in 1762 the Bute administration granted him a pension of £300 per annum, which he accepted after a short struggle against the reception of a favor from the house of Hanover. His own sarcastic definition of the word pensioner, in the "Dictionary," was naturally enough quoted on this occasion; but the sterling and acknowledged merits of the man formed a satisfactory apology. His advanced reputation and amended circumstances now considerably enlarged his acquaintance, and he became a member of a weekly club in Gerrard street, Soho, composed of the most eminent men of talents of the day — Goldsmith, Burke, Garrick, Sir Joshua Reynolds, etc. In the following year (May 16), in spite of his well-known inveterate prejudice against the Scotch, the first interview with his now equally famous biographer, James Boswell, was effected in the back parlor of Tom Davies, actor and bookseller. The acquaintance then commenced was sedulously cultivated by Boswell, and for more than 20 years the worship of his great friend was the grand, ideal, voluntary business of his life. In 1765 commenced that intercourse with the Thrale family which produced Johnson so much social enjoyment, and in the same year appeared his long promised edition of Shakespeare, which was ushered in by an admirable preface; but the work itself did not altogether answer public expectation, owing principally to the superficial acquaintance of the commentator with the writings of the age in which Shakespeare flourished.

In 1770, though his pension was given without conditions, his attachment to the monarchical side in general politics led him to compose a pamphlet, entitled the "False Alarm," in favor of the resolution of the House of Commons in the affair of Wilkes — that expulsion implied incapacity of re-election. This production was followed by "Thoughts on the Late Transactions in Falkland's Island"; against the conduct of Spain in regard to that unprofitable possession; the "Patriot," written on the era of the general election, in 1774; and "Taxation no Tyranny," a more considerable effort which made its appearance in 1775 against the arguments of the American colonists relative to the power claimed by the mother country to tax them at pleasure. In 1773 he made a tour to the Hebrides in company with his friend Boswell, of which he gives a highly instructive account in his "Journey to the Western Isles of Scotland." In this production he pronounced decidedly against the authenticity of "Ossian," which sentence involved him in a broil with Macpherson. In 1775 he received the diploma of D. C. L. from the University of Oxford, and soon after visited France in company with the Thrales and Baretti. His last literary undertaking was his "Lives of the Poets," which was completed in 1781; they were written to accompany an edition of the works of the principal English poets. With an occasional exhibition of political bias and strong prejudices, a conspicuous instance of which is supplied by the life of Milton, they form a valuable addition to English biography and criticism. The concluding portion of Johnson's life was saddened by the loss of many old friends and by declining health. In 1783 he was greatly alarmed by a paralytic stroke and his health never wholly recovered the shock, though he lived till Dec. 13, 1784. For some days previous he retained all his horror of dissolution; but he finally died with devotional composure. His remains were interred in Westminster Abbey with great solemnity. His statue has been placed in St. Paul's.

From the numerous and copious biographical tributes to the memory of Dr. Johnson and especially that of Boswell, few persons have been made so well known to the public either as authors or men. In the former capacity he is more to be admired for vigor and strength than for novelty of conception. No writer delivers moral maxims and dictatorial sentences with more force, or lays down definitions with more grave precision. He also ex-

cels in giving point to sarcasm, and magnificence to imagery and abstraction. His critical acumen, setting aside personal and political prejudices, was likewise very great; but he is utterly averse to the easy and familiar, both in his style and sentiment, the former of which made an era in English composition. His style is marked by an exuberance of words of Latin etymology, and though its sonorous rotundity of phrase has betrayed some able writers into injudicious imitation, the admiration in which it was formerly held has now long subsided.

As a man Dr. Johnson was, in mind as in person, powerful and rugged, but he was capable of acts of benevolence and of substantial generosity which do honor to human nature. His strong prejudices have been already mentioned, and it is to be regretted that his admirable conversational and argumentative powers were sullied by dictatorial arrogance and the most offensive impatience of contradiction — qualities that were unhappily heightened by the extreme deference and lavish admiration with which he was treated on arriving at the summit of his reputation. The effect was more injurious to himself than to his hearers, as it evidently fostered the seeds of bigotry and intolerance with which he set out in life. On the whole, however, both the moral and intellectual character of Dr. Johnson stand very high, and he may be regarded without hesitation as one of the most eminent of the distinguished writers of the 18th century.

Johnson, Sir William, a British officer; born in Warrentown, County Down, Ireland, in 1715. In 1738 Johnson established himself as the manager of the estates of his uncle (Admiral Sir Peter Warren), on the S. side of the Mohawk river, about 27 miles from Schenectady, N. Y. Here he speedily gained the confidence of the surrounding Indians, learned their language, and was adopted as a sachem by the Mohawks. In 1743 he was appointed by the British government chief superintendent of the Indians, and in 1750, a member of the provincial council. At the close of the war with the French, in 1753, Johnson threw up his commission, and retired to his fortified residence, called Fort Johnson. In 1755 he met and destroyed the French army under Baron Dieskau, at Fort George. In recognition of his services, Johnson was presented by the English government with a grant of 100,000 acres of land in the valley of the Mohawk, where he built the village of Johnstown, which became in 1772 the capital of Tryon county. He died near Johnstown, N. Y., July 4, 1774.

Johnston, Albert Sidney, an American miltary officer; born in Macon co., Ky., in 1803; was graduated at the United States Military Academy in 1826; resigned his commission in the United States army in 1834, and enlisted in the army of Texas, of which he became commander-in-chief; made secretary of war of the Republic of Texas in 1838. He used all his influence in bringing about the annexation of Texas to the United States; and served in the Mexican War with marked distinction. In 1857 he was put in command of an expedition to Utah to force the Mormons to submit to the laws of the United States government, and showed such ability and tact in the delicate mission that he was brevetted Brigadier-General. When the Civil War broke out he was in command of the Department of the Pacific, but promptly resigned; was made a General in the Confederate army and assigned to the command of the Department of Kentucky. On April 3, 1862, he marched from Corinth, Miss., intending to attack Grant at Pittsburg Landing, or Shiloh Church, 20 miles off, on the 4th. There was delay on the part of some of the troops so that the attack could not be made till the morning of the 6th, but with his 40,000 men Johnston attacked Grant's 50,000 with such impetuosity, skill, and dash that the National force was driven back at every point, and huddled together at Pittsburg Landing. Just as Johnston remarked to one of his staff: "The victory is ours. We shall soon water our horses in the Tennessee river," he was stricken with a minie ball and bled to death in 15 minutes. Johnston's death delayed the contemplated attack and in the meantime Buell and Wallace came up with 25,000 fresh troops, and thus the fruits of Johnston's early victory were lost, and the next day the Confederate army was forced to fall back to Corinth.

Johnston, Alexander Keith, a Scotch cartographer; born near Edinburgh, Scotland, Dec. 28, 1804. His first important work, the "National Atlas" occupied him for five years and was published in 1843. Acting on a suggestion from Humboldt, he visited Germany and gathered material for his "Physical Atlas." His "Royal Atlas of Geography" (1861) was one of the most beautiful and minutely accurate atlases ever executed up till that time. He died July 10, 1871. His son, ALEXANDER KEITH, born in 1846, was educated in Edinburgh, trained as a draughtsman in his father's firm, and afterward extended his experience in London and Germany. He took part in an exploring expedition to Paraguay in 1874, and in 1879 was appointed leader of the Royal Geographical Society's expedition to East Africa, mainly for the purpose of discovering a practical route to the inter-

ior. He was scarcely a month on the way when he died, June 28, 1879.

Johnston, James F. W., a Scotch chemist; born in Paisley, Scotland, in 1796. His "Catechism of Agricultural Chemistry and Geology" has gone through more than 50 editions, and has been translated into almost every European language. He died in Durham, Sept. 18, 1855.

Johnston, Joseph Eggleston, an American military officer; born in Cherry Grove, Va., Feb. 3, 1807; was graduated at the United States Military Academy in 1829; greatly distinguished himself in the Florida and Mexican Wars; promoted quartermaster-general of the army with the rank of Brigadier-General in June, 1860; resigned his commission when Virginia seceded; made Major-General of Virginia Volunteers and later full general in the Confederate service; took an active part in the first battle of Bull Run where he personally led a charge with the colors of the 4th Alabama Regiment in his hands. During the autumn of 1861 he had a bitter controversy with Jefferson Davis, holding that inasmuch as he had outranked Cooper, Albert S. Johnston, and Robert E. Lee in the United States army he was entitled to do so in the Confederate army. On March 12, 1863, he was ordered to take immediate command of Bragg's army, but the condition of his health made him ask to be relieved from that duty. In the operations of Grant before Vicksburg he did everything in his power to prevent Pemberton from allowing himself to be shut up in Vicksburg, telegraphing him May 2d: "If Grant crosses, unite all your troops to beat him. Success will give back what was abandoned to win it." Again and again he sent similar orders to Pemberton, but they were disobeyed; Pemberton allowed himself to be shut up in Vicksburg, and the siege and surrender on July 4th followed. In December of the same year he took command of Bragg's army at Dalton, Ga., and by the spring of 1864 brought it to a state of efficiency which it had not had for a long time, though it contained only 45,000 men against Sherman's 98,797. The campaign from Dalton to Atlanta, a distance of 100 miles, was a series of severe engagements without a general battle, and Johnston's friends claimed that "the retreat had been the masterpiece of Johnston's life, and one of the most skillful and successful that had ever been executed." On July 17, 1864, Johnston was succeeded in this command by General Hood. After the war he engaged in business; was member of Congress in 1876–1878, and United States Commissioner of Railways in 1885–1889. He died in Washington, D. C., March 21, 1891.

Johnston, Richard Malcolm, an American author; born in Powelton, Ga., March 8, 1822; was graduated at Mercer University in 1841; admitted to the bar in 1843; Professor of Literature in the University of Georgia in 1857–1861; was an officer in the Confederate service during the Civil War. In 1867 he settled in Baltimore, Md., and devoted himself to literature. His publications include "Historical Sketch of English Literature"; "Life of Alexander H. Stephens"; "Dukesborough Tales"; "Old Mark Langston"; "Ogeechee Cross-Firings"; etc. He died in Baltimore, Md., Sept. 23, 1898.

RICHARD M. JOHNSTON.

Johnston, William Preston, an American educator; born in Louisville, Ky., Jan. 5, 1831; was graduated at Yale College in 1852 and at the Louisville Law School in 1853; colonel and aide-de-camp to Jefferson Davis in the Confederate army during the Civil War; Professor of History and Literature at the Washington and Lee University in 1866–1877; and was president of Tulane University, New Orleans, from 1884 till his death. His publications include "Life of General Albert Sidney Johnston"; "The Johnstons of Salisbury"; "The Prototype of Hamlet"; and "Seekers after God" (poem). He died in Lexington, Va., July 16, 1899.

Johnstone, Christian Isobel ("Margaret Dods"), a Scotch novelist; born in Fifeshire in 1781. She edited, in association with her husband as publisher, many periodicals and papers, and wrote popular tales, notably: "Clan Albin: a National Tale" (1815); "Elizabeth de Bruce" (1827); "The Edinburgh Tales" (1845–1846), and others, described as forceful, brilliant, and entertaining. She also compiled "The Cook and Housewife's Manual" (1826). She died in Edinburgh, Aug. 26, 1857.

Johnstown, a city and county-seat of Fulton co., N. Y.; on Cayadutta creek, and on the Florida, Johnstown and Gloversville railroads; 48 miles N. W. of Albany. There are electric lights and street railroads, high school, grist mills and extensive manufactures of gloves and mittens. It has sev-

eral savings banks, daily, weekly and monthly periodicals, and an assessed property valuation exceeding $3,000,000. Pop. (1900) 10,130; (1910) 10,447.

Johnstown, a city in Cambria co., Pa.; on the Conemaugh river and Stony creek, and on the Pennsylvania and the Baltimore and Ohio railroads; 78 miles E. of Pittsburg. It contains the great Cambria iron and steel plant, wire, tinplate, wall-paper, paint, cement, fire brick, and leather and woolen manufactories; is the mining, lumbering, stone working, farming, and manufacturing trade center for a region having a population of 225,000; is the seat of Rowe College, Cambria and Johnstown Memorial Hospitals; and has 3 National and other banks, electric light and street railroad plants, daily, weekly, and monthly periodicals, and an assessed property valuation exceeding $10,000,000. On May 31, 1889, the city was the scene of a terrible disaster caused by the breaking of the dam across the South Fork of the Conemaugh river, at a point 10 miles E. of the city. The entire valley was in a few minutes devastated and the city of Johnstown and its surrounding villages were practically swept away. Various estimates placed the loss of life at from 2,300 to 5,000, and the property destroyed was estimated at $10,000,000. The suffering caused by the disaster led to spontaneous measures of relief from all parts of the country, in which State and municipal authorities and individuals heartily joined. Pop. (1890) 21,805; (1900) 35,936; (1910) 55,482.

Johor, or **Johore,** a Malay sultanate, in the extreme S. of the Malay Peninsula, its S. half extending from the Strait of Malacca to the South China Sea, its N. portion stretching somewhat in the form of a wedge N. to 3° N., between Malacca and Negri Sembilan on the W. and Pahang on the E.; capital Johor. There is a short railway from the port of Bandar Maharani on the W. coast to important plantations in a fertile district to the S. E., and a line is projected from the town of Johor, running N. W. through nearly the whole length of the territory; area about 7,500 square miles; pop. estimated at 300,000; Chinese, 210,000; Malays, 50,000.

Johor, or **Johore Baru,** capital of the state of Johor, on the S. coast, opposite the middle of the island of Singapore; a free port; in 1866 a place composed of only a few huts; but in 1899 a town with about 18,000 inhabitants.

Joinder, in law, the joining or coupling of two things in one suit or action; also the joining or coupling of two or more parties as defendants in one suit; or the acceptance by a party in an action of the challenge laid down in his adversary's demurrer or last pleading.

Joint, in anatomy, the union of any two segments of an animal body, through the intervention of a structure or structures different from both. The different kinds of joints may be thus classified: 1. Synarthrosis: (1) Suture, (2) Schindylesis, (3) Gomphosis, (4) Amphiarthrosis. 2. Diarthrosis: (1) Arthrodia, (2) Enarthrosis, (3) Ginglymus, and (4) Diarthrosis rotatorius. The terms symphysis, synchondrosis, syneurosis, syssarcosis, and mennigosis, formerly applied to joints, are now discarded.

In carpentry, a mode of securing together the meeting edges of wooden structures; the place where one piece of timber is united to another. The straight joint is where the edges make a butt-joint, being planed straight. Timbers are generally joined by mortises and tenons, or by straps and bolts. The various kinds of joints are named according to their forms and uses, thus: (1) A butting joint, in carpentry, is one in which the fibers of one piece are perpendicular to those of the other; in machinery, one in which the pieces meet at right angles. (2) A bevel joint, one in which the plane of the joint is parallel to the fibers of one piece and oblique to those of the other. (3) Dove-tail joint. (4) A longitudinal joint is one in which the common seam runs parallel with the fibers of both. (5) A miter joint, one formed by the meeting of matching pieces in a frame, the parts uniting on a line bisecting the angle, which is usually, but not necessarily, one of 90°. (6) A square joint, one in which the plane of the joint is at right angles to the fibers of one piece, and parallel to those of the other.

In geology, a natural fissure or line of parting traversing rocks in a straight and well-determined line, often at right angles to the planes of stratification. If in a quarry a sufficient number of joints cross each other, the rock is broken up into symmetrical blocks, thus greatly facilitating the labors of the men employed. The faces of the joints are generally smoother and more regular than the surface of true strata. The partings which divide columnar basalt into prisms are joints. The spaces between two joints show no tendency to split indefinitely, thus distinguishing it from slaty cleavage. Rutley considers jointing due to the consolidation either of sediment by drying or of eruptive matter by cooling. This makes them so contract as to produce fracture along more or less parallel lines.

In masonry, the face-joints of voussoirs are those which appear on the face of the arch. The vertical joint is between stones of the same course. The horizontal joint

is between courses. The coursing-joint is the joint between the courses of voussoirs. The heading-joint is that between two voussiers in the same course. The flush-joint is filled up to the face by pointing with mortar.

In plumbing, the sheets of sheet-metal roofing are joined by a drip-joint or a flashing-joint in cases where they are not soldered. A flush-joint or jump-joint is a butt joint covered with a plate on the inner side, called the butt plate. In a lap-joint the pieces overlap each other.

The word is also applied in slang to an opium-smoking den; or any resort of bad repute.

Joint High Commission. See ANGLO-AMERICAN COMMISSION.

Joint Stock, stock held jointly or in company. A joint stock company is a kind of partnership entered into by a number of individuals for the purpose of carrying on some trade or business with a view to individual profit; invested by statutes, in Europe and many of the United States, with some of the privileges of a corporation. In ordinary partnerships the members contribute more or less of their own personal labor or management to the affairs of the company. In joint stock partnerships, on the other hand, the members only contribute to the funds or "stock" of the company without having any direct share in the management; and hence their name. The capital of the company is generally divided into equal parts, called "shares," a certain number of which are held by each member of the company; and in proportion to the number of these he is entitled to participate in the profits of the undertaking. These shares are freely transferable without the consent of the company. The immediate superintendence of the affairs of the company is usually delegated to a portion of the members, called directors, subject, nevertheless, to the general control of the body assembled at stated intervals, or on particular occasions, when they may be convened; except on such occasions, however, the general body of the shareholders have no power to interfere in its concerns or to bind the company. The increased facilities which the wealth and influence of a number of individuals, concentrated in the hands of a few, give for carrying out commercial projects, were seen and taken advantage of early in the history of commerce. The most noted among the earlier associations of this kind was that of the Hanse towns, which continued to flourish for several centuries.

Joint Tenancy, the joint ownership of two or more persons in land or other property. The creation of an estate in joint tenancy depends on the wording of the deed or device by which the tenants claim title—for this estate can only arise by purchase or grant, — that is, by the act of the parties, and never by mere act of law.

Jointure, an estate in lands or tenements settled upon a woman in consideration of marriage, and which she is to enjoy after her husband's decease.

Joinville (zhwa*ng*-vēl′), a small town of 4,000 inhabitants in the French department of Haute-Marne, which was formed into a principality by Henry II., and later supplied the title to the 3d son of Louis Philippe.

Joinville, François Ferdinand Philippe Louis Marie d'Orleans, Prince de, third son of Louis Philippe, King of France; born in Neuilly, near Paris, France, Aug. 14, 1818. On completing his education he entered the French navy. In 1836 he became lieutenant; in 1837 joined his brother, the Duke de Nemours, at Constantine, soon after the taking of that city; during the war with Mexico, in 1838, he engaged the batteries of St. Jean d'Ulloa, with his corvette the "Creole"; and shortly afterward, at the head of his sailors, stormed the gate of Vera Cruz and took prisoner General Arista, for which he received the cross of the Legion of Honor, and was appointed post-captain; in 1840 he brought to France from St. Helena the remains of Napoleon I.; in 1843 he married, at Rio Janeiro, the Princess Francesca of Braganza, sister of Don Pedro II., and was the same year promoted to rear-admiral; in 1845 he commanded the fleet that bombarded Tangiers and captured Mogador, on which he became vice-admiral; during the events of 1848 he was at sea before Algiers; surrendering his command to the Republicans, he joined his exiled family at Claremont. With his nephews, the Comte de Paris and the Duc de Chartres, he accompanied General McClellan in the Virginian campaign of 1862, and published on it an impartial article in the "Review of Two Worlds," of 1863; he served incognito in the Franco-Prussian war, 1870–1871; in 1873 he was elected to the French Assembly. He died in Paris, France, June 17, 1900.

Joinville, Jean, Sieur de (zhwa*ng*-vēl′), a noted French chronicler; born in Champagne, France, in 1224. He took part in Louis IX.'s crusade, and on his return spent his leisure composing his invaluable "Memoirs," which embody the important "History of Saint Louis," sometimes treated as a separate work. He died July 16, 1317.

Joist, a horizontal timber supporting a floor or ceiling, one or both. Single flooring is formed with joists reaching from wall to wall, where they rest on plates of timber built into the brickwork. The floor boards are nailed on the upper edges of

the joists, whose lower edges receive the lathing and plastering of the ceilings. Double floors are constructed with stout binding joists, a few feet apart, reaching from wall to wall and supporting ceiling joists, which carry the ceiling, and bridging joists, on which are nailed the floor boards. When the main timbers of the floor are girders which rest on the wall plates and support the binding joists, the floor is called a framed floor. The binding joists support the bridging joists and ceiling joists as before. The trimming joists are short joists into which trimmers are mortised. Trimmers are pieces around a fire hearth or a hatchway, where the continuity of the joists is broken. See TRIMMER.

Jokai, Maurus (yō'ko-i), a Hungarian novelist; born in Komora, Feb. 19, 1825. He studied law, but never practised. In 1846 he was editor of the famous "Weekly

MAURUS JOKAI.

Journal"; later of the "Comet," the leading weekly humorous paper of Budapest, and of the government journal, the "Nation," in Magyar, etc. During the Hungarian struggle of 1848 he was an active patriot, but after the restoration of Austrian rule he was obliged to abstain from political writing and thereafter devoted himself to fiction. He wrote almost 300 volumes, including novels, dramas, poems, etc. In January, 1894, all Hungary united in celebrating the 50th anniversary of his first book, "Working Days," and an edition de luxe of his complete works was published at $1.00 a copy, groups of poor people and whole villages combining to purchase copies. He was married in 1848 to Rosa Laborfalvi, the greatest of Hungarian actresses. His best-known works are: "Poor Rich Men," "The World Turned Upside Down," "The Romance of the Next Century," "Black Diamonds," "Eyes Like the Sea," "The Accursed Family," "Timar's Two Worlds," "Pretty Michal," "Midst the Wild Carpathians," "In Love with the Czarina," etc. He died May 5, 1904.

Jokjokerta (jok-yō-kur'tä), a residency of Java, in the central part of the island; area, 1,191 square miles; pop. 474,519, nearly all Javanese (see JAVA). Capital Jokjokerta, with the sultan's palace and ruins of ancient temples; pop. about 45,000.

Joliet, a city and county-seat of Will co., Ill., on both sides of the Des Plaines river, on the Illinois and Michigan canal, and on the Atchison and Topeka and Santa Fe, the Rock Island and Pacific and other railroads; 40 miles S. W. of Chicago. The city contains the Silver Cross and St. Joseph's Hospitals, State penitentiary, and St. Francis and St. Mary Academies, public library, high school, and Swedish Orphan Home; is largely concerned in the steel industry; and has manufactories of steel and barbed wire, stove and boiler works, machine shops, tin plate and horseshoe works, boot and shoe factories and flour mills. There are electric lights and street railways, 3 National banks, daily, weekly, and monthly periodicals, and an assessed property valuation exceeding $600,000. Pop. (1890) 23,264; (1900) 29,353; (1910) 34,670.

Joliet, Charles (zhō-lyā'), a French journalist; born in St. Hippolyte-on-the-Doubs, France, Aug. 8, 1832. He contributed to every periodical of note in Paris, producing likewise countless volumes, such as: "The Athenians," poems; "The Ladies' Doctor," a humorous narrative; "The Viper," a study of woman; "The Story of Two Young Wives," a novel; etc.

Joliet, Louis, a French-Canadian explorer; born in Quebec, Canada, Sept. 21, 1645. Educated for the priesthood, he became a merchant. In 1672 he was commissioned by Frontenac, the governor of New France, to make explorations in that country, and in 1673, in company with Father Marquette, a Jesuit priest, and five other Frenchmen, he explored the Fox, Wisconsin, Illinois, and Mississippi rivers. He died in May, 1700.

Jolin, Johan Kristofer (yō'lin), a Swedish author; born in Stockholm, Dec. 28, 1818. His work, which is popular and original, includes "Master Smith," a drama, and "Vinglaren," a novel, besides pleasing verse. He died in Stockholm, Nov. 13, 1884.

Jolite. See CORDIERITE.

Jolly Balance (named from Prof. Philip Jolly, of the University of Munich), a spring balance for determining the specific gravity of small solids, such as specimens of minerals, by weighing them in air and water.

Jollyboat, a small boat used for the general miscellaneous work of the ship, such as bringing off marketing, etc. A boat of this kind attached to United States vessels of war is called a dingy. It is clinker built, from 16 to 20 feet long, with a beam from .33 to .20 of its length.

Joly, Guy (zhō-lē′), a 17th-century French writer of memoirs, who came into some prominence during the Fronde, and compiled "Memoirs to explain and continue those of the Cardinal de Retz" (1718), a curious, readable, and accurate, yet partisan work.

Jomelli, Niccolo (yō-mel′lē), an Italian composer; born in Naples, Italy, Sept. 11, 1714. He was the author of 36 operas, which were generally very popular. His celebrated "Requiem" and "Miserere" are often played in Roman Catholic Churches. He died in Naples, Italy, Aug. 28, 1774.

Jomini, Baron Henri (zhō-mē-nē′), a Swiss writer on military science; born in Payerne, Vaud, Switzerland, March 6, 1779. He began his military career in the Swiss Guards at Versailles, and finally rose to be chief of the staff to Marshal Ney; he was created baron after the peace of Tilsit. In 1804 he attracted the notice of Napoleon by his "Treatise on Large Military Operations." He distinguished himself at Jena, in the Spanish campaigns of 1808 and succeeding years, during the retreat from Russia, and at Lützen and Bautzen; but offended at the treatment which he received from Napoleon, he entered the service of Russia in 1814. In 1828 he took an active part in the war Russia waged against Turkey, particularly in the capture of Varna. His fame as a military writer rests on: "Critical and Military History of the Campaigns of the Revolution" (1806); "Life of Napoleon" (1827); "Summary of the Art of War" (1830; new ed. 1881). He died in Passy, near Paris, France, March 24, 1869.

Jonah, a prophet, the son of Amittai, and a native of Gath-hepher (II Kings xiv: 25), a border town of the tribe of Zebulun (Joshua xix: 13). He lived prior to or in the reign of Jeroboam II. (II Kings xiv: 23, 25), who ascended the throne 824 B. C.

The Prophecies of Jonah.—The fifth in order of the minor prophets, but perhaps the first in date. The book is partly in prose, partly in poetry. It opens with a divine command given to Jonah to go to Nineveh and cry against it for its wickedness. In place of obeying this injunction, the prophet, who was of perverse disposition, went to the sea and paid his fare for a voyage to Tarshish. A storm arising, the story continues, those on board cast lots to ascertain whose delinquency had raised the tempest, and the lot fell on Jonah. He, having admitted that he was fleeing from Jehovah, was cast overboard by his comrades, when the agitated ocean sank into a calm. A great fish swallowed the prophet, who remained alive in the body three days and three nights. His prayer offered from his living dungeon being answered, the fish vomited him out on the dry land. The closing episode of the narrative represents the prophet in the execution of his ministry. A second time he was ordered to go to Nineveh, and this time he obeyed. The people, alarmed by his declaration that in 40 days the city should be destroyed, humbled themselves before God and thus averted the threatened judgment. On this the prophet petulantly complained of the Divine goodness, and was yet more impatient when a gourd which had grown up in a night to shelter him as rapidly withered away. Jehovah vindicated His action and justly rebuked the prophet. Some have thought the book an allegory rather than a narrative of real events. But it is quoted apparently as a history in the New Testament, and in one place the confinement of Jonah in the whale's belly is regarded as typical of the similar period during which Jesus was to remain in the bowels of the earth (Matt. xii: 39–41, xvi: 4; Luke xi: 29, 30, 32).

Jonas, Justus (yō′näs), a helper of Luther in the work of reformation and translation of the Bible; born in Nordhausen, Prussia, June 5, 1493. He was professor at Wittenberg, pastor at Halle and Coburg, and superintendent at Eisfeld. He took part with Luther in many of the great events of the Reformation, as at Worms, Marburg, and Augsburg. He died in Eisfeld, Saxe-Meiningen, Oct. 9, 1555.

Jonathan, a son of Saul, and the constant and unshaken friend of David, proving the sincerity of his regard by repeatedly saving his friend's life when threatened by the fury of his father. Jonathan fell in battle in the war with the Philistines.

Jonathan, son of Mattathias, and brother of Judas Maccabæus, a famous Jewish general. He compelled Bacchides, the Syrian commander, to sue for peace; defeated Demetrius Soter and his general Apollonius. At length he fell by treachery into the hands of Tryphon, who, after receiving a large sum as a ransom for him, put him to death, 144 B. C.

Jonathan, Brother. See BROTHER JONATHAN.

Jonckbloet, Willem Jozef Andreas (yonk′bluht′), a Dutch historian; born in The Hague, July 6, 1817. He is a conceded authority on Dutch letters, his masterpieces on "The Middle Dutch Epic"

(1849), "The History of Middle Dutch Literature" (1851–1854), and "Study of the Romance of Renard" (1863), exhausting those subjects; and his editions of Dutch classics are the standard. He died in Wiesbaden, Oct. 19, 1885.

Jones, Charles Colcock, an American author; born in Savannah, Ga., Oct. 28, 1831. He was lieutenant-colonel in the Confederate service during the Civil War, afterward removing to New York, where he practised law. Among his works are: "Antiquities of the Southern Indians" (1873); "Siege of Savannah in 1779" (1874); "History of Georgia" (1883). He died July 19, 1893.

Jones, Davy, in sailors' superstition, an evil spirit of the sea, whose locker or chest is the bottom of the ocean. The name appears to be derived from that of Jonah.

Jones, Ebenezer, an English poet; born in Islington, England, Jan. 20, 1820; was brought up in the strictest sect of the Calvinists, but at 13 was writing verses and in secret devouring the Waverley novels. In 1837 he was forced by his father's long illness to become a clerk in a city warehouse; his hours were 8 to 8 six days a week. Yet he published his "Studies of Sensation and Event" (1843), poems admired by such poets as Browning and Rossetti. But the world rejected them, and he published no more, save a pamphlet on the "Land Monopoly" (1849), which is said to have anticipated Henry George by 30 years in proposing to nationalize the land. He died in Brentwood, Sept. 14, 1860.

Jones, Ernest Charles, an English poet, novelist, and agitator; born in Berlin, Jan. 25, 1819. He became a leader in the Chartist agitation, to which he sacrificed a large fortune. His prose and poetry were inspired by his political opinion; "The Lass and the Lady" (1854) and "Lord Lindsay" being his best fictions, and "The Battle Day and Other Poems" (1855) containing his most popular songs. He died in Manchester, England, Jan. 26, 1868.

Jones, Evan, a Welsh poet; born in Bryntynoriad, Sept. 5, 1820. He was a clergyman, and best known as IEUAN GWYNEDD, over which name he produced in his native tongue poems on "The Huts of Wales," "Moses on Mount Pisgah," "Peace," and other themes; in addition to which he edited many periodicals, including "Yr Adolygdd," or "National Review." He died near Cardiff, Feb. 23, 1852.

Jones, Henry, pseudonym CAVENDISH, an English whist expert; born in London, England, Nov. 2, 1831. His work, "Laws and Principles of Whist" (1862), and many kindred writings, are celebrated. He died Feb. 10, 1899.

Jones

Jones, Henry Arthur, an English dramatist; born in Grandborough, Bucks, England, Sept. 28, 1851. He wrote: "A Clerical Error" (1879); "Silver King" (1882); "Saints and Sinners" (1884); "Middleman" (1889); "Judah" (1890); "The Dancing Girl" (1891); "The Tempter" (1893); "The Masqueraders" (1894); "The Triumph of the Philistines" (1895); "The Rogue's Comedy" (1896); "The Liars" (1897); "The Manœuvres of Jane" (1898); "Carnac Sahib" (1899); etc.

Jones, Inigo, the reviver of classical architecture in England in the beginning of the 17th century; born in London, England, July 15, 1573. He attracted the notice of the Earl of Pembroke, who sent him to Italy to study art. He went to Venice, where the works of Palladio inspired him with a taste for architecture. Having returned to England, he became court architect under James I. and Charles I. Among his best-known works are the Banqueting House at Whitehall, Asburnham House, Covent Garden Piazza, Heriot's Hospital, Edinburgh, and Shaftesbury House. Being a Roman Catholic and the partisan of royalty, he suffered heavy losses during the Civil War, and died in poverty in London, June 21, 1652.

Jones, Jacob, an American naval officer; born near Smyrna, Del., in March, 1768; joined the United States navy in 1799; served in the war with Tripoli; was captured in 1803 and held a prisoner for 18 months; made commander of the "Wasp" in 1811, and with her captured the English brig "Frolic" Oct. 18, 1812, but on the following day he fell in with the English war vessel "Poictiers," 74 guns, by which both the "Wasp" and its prize was taken. For his victory over the "Frolic" Jones was voted a gold medal by Congress, and $25,000 was granted to him and his crew in payment of the personal loss they had sustained. He died in Philadelphia, Pa., Aug. 3, 1850.

Jones, John Paul, an American naval officer; born in Kirkham, Kirkcudbrightshire, Scotland, July 6, 1747. His father, whose name was John Paul, was gardener to the Earl of Selkirk. He entered the merchant service, was engaged in the American and West Indian trade, and is said to have realized a handsome fortune. On the outbreak of war between the colonies and mother country he offered his services to the former, and in 1778, being then in command of the "Ranger," he made a descent on Whitehaven, set fire to the shipping, and plundered the Earl of Selkirk's mansion. Next year, in command of the "Bon Homme Richard" (42 guns) and a small squadron, he threatened Leith, and captured the British sloop of war "Serapis" after a bloody

engagement off Flamborough Head. On his return to America he was somewhat neglected by Congress, and in 1788 entered the Russian service with the rank of rear-admiral, but owing to the jealousy of the Russian commanders soon retired from this service. He returned to Paris, where he died in poverty and ill health, July 18, 1792. He was honored with a public funeral, but apparently all trace of his grave had been lost, until a search conducted by the American ambassador to France, Horace Porter, led to its discovery on April 14, 1905, in the old St. Louis Cemetery in Paris. The body was exhumed and conveyed to the United States by an American squadron despatched to France for that purpose, and was interred at Annapolis, Md., with military honors.

Jones, Joseph Stevens, an American playwright; born in 1811; was graduated at the Harvard Medical School in 1843, and practised for several years; proprietor and manager of the Tremont, Old National, and other theaters in Boston at different times. He was the author of about 200 plays, including "Solon Shingle," "The Liberty Tree," "The Siege of Boston," "Moll Pitcher," "Job and Jacob Gray," "The Last Dollar," "The People's Lawyer," "Paul Revere," "The Silver Spoon," etc. He died in Boston, Mass., Dec. 30, 1877.

Jones, Owen, an English architect and designer; born in London, Feb. 15, 1809. He laid the foundations of his knowledge in the office of Vulliamy, an architect and decorator in London, traveled for four years in Southern Europe, and published: "Designs for Mosaic and Tesselated Pavements" (1842); "Plans, Elevations, Sections, and Details of the Alhambra" (1845); "Polychromatic Ornament of Italy" (1845); "Principles Regulating the Employment of Color" (1853); "Grammar of Ornament" (1855), still a valuable text-book; "One Thousand and One Initial Letters" (1864); "Examples of Chinese Ornament" (1867). He also illustrated several books. He was superintendent of works for the London Exhibition of 1851, and director of decorations for the Crystal Palace. He died in London, April 19, 1874.

Jones, Sir William, an English Oriental scholar and linguist; born in Westminster, England, Sept. 28, 1746. He was educated at Harrow and Oxford. Devoting himself to the study of languages, he became the most celebrated English linguist of his time, being familiar with both the dialects and literature of 27 languages. He was called to the bar in 1774, and, in 1783 was appointed judge of the Supreme Court of Bengal. In India he further distinguished himself by his researches into Asiatic literature and archæology, and became the first president of the Asiatic Society. His translations from the Hindu, Persic, and other Oriental tongues are many and various. A complete edition of his works was printed in London, in 13 volumes, in 1813. He died in Calcutta, April 27, 1794.

Jonesboro, a city and county-seat of Clayton co., Ga.; about 80 miles N. W. of Milledgeville. Here, Aug. 31, 1864, General Howard defeated the Confederates under General Hardee, who lost about 1,400 men.

Jonge, Johan Karel Jacob de (yông'ŭh), a Dutch historian, son of Johannes; born in The Hague, June 17, 1827. He studied the colonial history of his country with effect, as "The Rise of Netherland Dominion in the East Indies" (1862–1878), and other works, demonstrate. He died in The Hague, March 15, 1880.

Jonge, Johannes Cornelis de, a Dutch historian; born in Zierikzee, May 9, 1793. He quarried indefatigably and with rich results in the Netherland vein; "Studies in the History of the Low Countries" (1825–1827) and "The History of the Dutch Navy" (1833–1848) being the best specimens. He died near Ryswick, June 12, 1853.

Jongleurs (zhôn*g*-glur'), among Provençals and Northern Frenchmen, a class of minstrels during the Middle Ages who sang and often composed poems, songs, and fabliaux, and who frequented courts, tournaments, castles, and towns for that purpose. They made a trade of song, poetry, and story-telling, and often of jesting and buffoonery, and are distinct from the knightly poets, the Troubadours and Trouvères. They were often for their special gifts retained in the service of particular lords, and we find them also named indifferently *ménestrels* (minstrels) or *ménestriers*. Two of their number, Jacques Grure and Hugues-le-Lorrain, founded the church of St. Julien in 1331.

Jönköping (yèn'chê-ping), a town of Sweden, capital of the *län* or county of Jönköping; at the S. end of Lake Wetter, 115 miles E. of Gothenburg. It is famous for its safety matches; paper, carpets, tobacco, etc., are also made. Here several Swedish Parliaments have been held, and peace was signed between Sweden and Denmark in 1809. Pop. (1905) 23,310.

Jonquil, a bulbous plant of the genus *Narcissus* (*N. Jonquilla*), allied to the daffodil. It has long lily-like leaves, and spikes of yellow or white fragrant flowers. The sweet-scented jonquil (*N. odorus*), a native of Southern Europe, is also generally cultivated. Perfumed waters are obtained from jonquil flowers.

Jonson, Benjamin, commonly called Ben Jonson, a celebrated English dramatist, the contemporary and friend of

Shakespeare; born in Westminster, England, in 1573. When young he ran away from home and entered the army, serving first in Flanders. On his return he went to Cambridge, but poverty obliged him to leave the university and take to the stage.

BEN JONSON.

At first he was not very successful, either as an actor or an author, and having killed another actor in a duel he was imprisoned and narrowly escaped with life. On being released from confinement he married, and recommenced writing for the stage, to which he was encouraged by Shakespeare, who performed in one of his pieces. In 1598 he produced his comedy of "Every Man in His Humor," which was followed by a new play every year till the reign of James I., when he was employed in the masques and entertainments at court. He joined Chapman and Marston in writing the comedy of "Eastward Hoe," which so grossly libelled the Scotch nation that the authors were committed to prison; and had they not made a timely and humble submission for the offense they would have lost their noses and ears in the pillory, according to their sentence. By his address he soon regained the favor of the king, and for the remainder of that reign he continued in high favor as a kind of superintendent of the court revels. In 1619 he was appointed poet-laureate, with a salary of $500, and a butt of canary wine yearly from the king's cellars. Want of economy, however, kept him constantly poor, though in addition to the royal bounty he had a pension from the city. His principal plays are "Sejanus," "Volpone," "Epicœne," and "The Alchemist." He died Aug. 16, 1637, and was buried in Westminster Abbey, where a tablet has been erected to his memory in Poet's Corner, inscribed, "O rare Ben Jonson."

Joplin, a city in Jasper co., Mo., on the Missouri Pacific and other railroads; 14 miles S. W. of Carthage and 168 miles S. of Kansas City. It is the commercial trade center of the Southwest Missouri lead and zinc mining district; principally engaged in mining, smelting, and the manufacture of white lead; has electric lights and street railroads; Holly system of waterworks; 2 National banks, and daily, weekly, and monthly periodicals; and an assessed property valuation exceeding $3,000,000. Pop. (1900) 26,023; (1910) 32,073.

Joppa. See JAFFA.

Joram, or **Jehoram** (-hō'ram), son of Ahab, King of Israel; successor of his older brother Ahaziah, 896 B. C. During his reign of 12 years the Moabites revolted. Joram secured the aid of Jehoshaphat, King of Judah, and after receiving for his ally's sake a miraculous deliverance from drought defeated the Moabites with great slaughter. Not long after he was involved in war with Ben-hadad, King of Syria, and Hazael his successor; and at this time occurred the miraculous deliverance of Samaria from siege and famine, and also various miracles of Elisha, including the healing of Naaman. Joram was wounded in a battle with Hazael, and met his death, in the suburbs of Ramoth-gilead, by the hand of Jehu his general. His body was thrown into the field of Naboth, at Jezreel, and with him perished the race of Ahab.

Joram, or **Jehoram,** the son and successor of Jehoshaphat, King of Judah. He reigned with his father, from 889 B. C., four years, and four years alone. Unhappily he was married to Athaliah, daughter of Ahab and Jezebel, whose evil influence did much to render his reign a curse to the land. He slew his own brothers, five in number, and seized their possessions. He also introduced Phœnician idols and their worship into Judah. A successful revolt of the Edomites, and repeated invasions of the Philistines and Arabians, made of his reign a calamity. His country, the city, and his own household were ravaged, his body was afflicted with a frightful dysenteric illness, and after death, a burial in the royal sepulchers was denied him.

Jordaens, Jakob (yor'däns), a Dutch painter; born in Antwerp, May 19, 1593. He was admitted into the St. Luke guild in 1615. He ranks next to Rubens among Flemish painters in the departments they both cultivated. Jordaens' style is marked by realistic fidelity and vigor of portraiture, and his coloring is generally good; but he is sometimes coarse and inelegant. He excelled in humoristic pieces depicting Flemish life, and painted also Scriptural and mythological subjects. He died in Antwerp, Oct. 18, 1678.

Jordan ("descending"), the principal river of Palestine, the bed of which forms a great valley stretching from N. to S., in the E. part of the country. It is formed by the junction of three streams. The highest source of the Jordan is the Hasbany, which rises near the Druse town of Hasbeiya, on the W. side of Mount Hermon. There is another spring on the S. side of the same mountain at Bânias (Paneas or Cæsarea Philippi), and the Leddan at Dan. The Jordan flows S., and after a course of a little over 100 miles, having passed through the small Huleh Lake (The Waters of Merom) and the Lake of Tiberias (Sea of Galilee), 682 feet below the Mediterranean, it falls into the N. extremity of the DEAD SEA (*q. v.*), 1,292 feet below the Mediterranean. Besides smaller affluents it receives four streams, the Wady Far'ah and Wady Kelt from the W., the Hieromax and Jabbok from the E. McGregor estimates the Jordan to have 200 miles of channel from the Hasbeiya source to the Dead Sea. The source is 1,700 feet above the Mediterranean, making a total fall when it reaches the Dead Sea of 3,000 feet. The bed of the river varies much in breadth, from 30 to 50 yards, flows latterly in a sunken channel, and its banks of white marl are in some places flat, in others steep; in the N. partly occupied by fields of barley, but barren below Jericho. There are upward of 40 fords, but the two at Jericho are impassable when the river is in flood. The course of the Lower Jordan was explored by Lieutenant Molyneux in 1847, by Lieutenant Lynch in 1848; the Upper Jordan for the first time by John McGregor in his Rob Roy canoe in 1869.

Jordan, David Starr, an American educator; born in Gainsville, N. Y., Jan. 19, 1851. He studied at Cornell and Harvard. After holding important professorships he served as president of the University of Indiana from 1885 to 1891. In the latter year he was made president of Leland Stanford Jr. University. He wrote "Science Sketches," "Care and Culture of Men," "Footnotes to Evolution," etc., and served on a number of important government commissions, especially in connection with the fisheries.

Jordan, Dorothea, an Irish actress; born in Waterford, Ireland, about 1762. She appeared first in Dublin, as Phœbe in "As You Like It." In 1782 she went to England and obtained an engagement from Tate Wilkinson, of the York circuit, with whom she acted for three years. She made her début at Drury Lane in "The Country Girl," in October, 1785, and in a few days she had bewitched the town; the benches formerly empty on the nights when Mrs. Siddons was not playing, were now filled, and her joyous, apparently irrepressible laugh — her "swindling" laugh, a friend called it — captivated all hearts. For nearly 30 years, mainly in the rôles of romps and boys, she kept her hold on the public. In 1790 commenced her connection with the Duke of Clarence, afterward William IV., which endured till 1811. He was warmly attached to her, and caused all who came to his house to treat her as his duchess. No satisfactory explanation has ever been given of the sudden breaking off of their relations. Her last years she passed in comparative poverty at St. Cloud, France, and she died there in June, 1816.

Jordan, Thomas, an American military officer; born in Luray, Va., Sept. 30, 1819; was graduated at the United States Military Academy in 1840; promoted 1st lieutenant in June, 1846, and distinguished himself in the Mexican War; was promoted captain in March, 1847; was stationed on the Pacific coast in 1856–1860, during which time he introduced steam navigation above the Dalles, on the Columbia river. He entered the Confederate service in 1861, with the rank of lieutenant-colonel; promoted Brigadier-General for gallantry at the battle of Shiloh. In 1869 he went to Cuba, where he was made chief of the general staff of the insurgent army and soon afterward commander-in-chief of the revolutionists; won a battle at Guarmaro, in January, 1870. In the following year he resigned and settled in New York city, where he became editor of "The Financial and Mining Record." He published "Campaigns of Lieutenant-General Forrest" (with J. B. Pryor, 1868). He died in New York city, Nov. 27, 1895.

Jordan, Wilhelm (yor'dän), a German poet and story-writer, and an eminent publicist; born in Insterburg, Feb. 7, 1819. His early poems and sketches brought him into trouble with the authorities; but he managed, notwithstanding, to rise to a position of power in public life, while as a literary man his eminence was long unquestioned. As a poet he voiced his liberal political aspirations through the medium of a chaste but not severe Muse, "Bells and Cannon" and "Earthly Fantasies" being characteristic. In fiction he strove to make propaganda and to demonstrate the necessity of a higher social state by exposing the evils of the existing one, and yet he was neither a revolutionist nor a socialist, as "The Sebalds" and "Two Cradles" amply prove. "Demiurgos," a philosophical poem, "The False Prince," a comedy, and "The Widow of Agis," a tragedy, are also his. He died Jan. 28, 1903.

Jordan, William George, an American journalist; born in New York city, March 6, 1864; was graduated at the College of the

City of New York; began his career as an editor in 1884, and afterward was engaged in the preparation of "Jordan's Guide to Poetry and Prose"; became managing editor of the "Ladies' Home Journal" in 1897, and of "The Saturday Evening Post" in 1898. He is the author of "Mental Training by Analysis, Law and Analogy" (a lecture); "Mental Training a Remedy for Education"; "The Kingship of Self Control," and "The Majesty of Calmness."

Jordans, Luca (yor'däns), an Italian painter; born in Naples in 1632. He studied the manner of Pietro da Tortona, but chiefly wrought in the style of Paul Veronese. He died in Italy in 1705.

Jornandes (-nan'dēz), or **Jordanis** (-dā'nis), historian of the Goths; by birth a Goth, or of both Alan and Gothic descent, and flourished in the middle of the 6th century. He was first a notary, but afterward, adopting the Christian religion, became a monk. He wrote two historical works in Latin: "On the Succession of Kingdoms and Times," and "Origin and Deeds of the Getæ," the latter based on the earlier work (now lost) of the Roman Cassiodorus. It is our only source of information about much connected with the Goths and other barbarian tribes.

Jorullo (HŌ-röl'yō), **Xurullo,** or **Xorullo,** a volcano of Mexico, about 75 miles S. S. W. of Valladolid, and 80 miles from the Pacific Ocean; lat. 19° 10′ N., lon. 101° 1′ 45″ W. The site of this remarkable mountain was formerly a fertile plain, about 2,890 feet above sea-level, but a violent eruption, on Sept. 28 and 29, 1759, raised it to an elevation of 4,265 feet, and sent forth immense quantities of lava, with stones of great size. The craters or cones were six in number, most of which are now extinct and surrounded by precipitous walls of basalt and ancient volcanic rocks. The elevation is about 4 square miles in area, and is covered with thousands of small mounds or *hornitos* (little ovens) from 6 to 9 feet high, from which, till recently, issued steam and sulphurous vapors. The San Pedro and Cuitimba, two rivers which formerly watered this tract, sink into the earth on the E. side, and appear again as hot springs on the W. side of the elevation.

JOSEPH BEFORE PHARAOH, BY RAPHAEL.

Joseph, the son of Jacob and Rachel; born in Mesopotamia (Gen. xxx: 22–24), 1747 B. C. His history is one of the most pleasing and instructive in the Bible; and is related in language inimitably natural, simple, and touching. It is too beautiful for abridgment, and too familiar to need rehearsal. Joseph died, aged 110, 1637 B. C.; and when the Israelites, a century and a half later, went up from Egypt, they took his bones, and at length buried them in Shechem (Ex. xiii: 19; Josh. xxiv: 32). A Mohammedan wely or tomb covers the spot regarded generally, and it may be correctly, as the place of his burial. It is a

low stone enclosure, and stands in quiet seclusion among high trees at the W. entrance of the valley of Shechem, at the right of the traveler's path, and nearer Mount Ebal than Mount Gerizim.

Joseph, the husband of Mary, Christ's mother. His genealogy is traced in Matt. i: 1–15, to David, Judah, and Abraham. His residence was at Nazareth in Galilee, where he followed the occupation of a carpenter, to which Christ was also trained (Mark vi: 3). When he became the husband of Mary, he was somewhat advanced in age, and is generally supposed to have died before Christ began His public ministry.

Joseph, or **Joses.** See BARNABAS.

Joseph, called BARSABAS and surnamed JUSTUS, one of the two persons chosen as worthy to fill the vacant place of Judas among the Twelve (Acts i: 23). Papias relates a tradition that he had been miraculously preserved by the Lord from the fatal effects of a cup of poison he had drunk.

Joseph, King of Naples. See BONAPARTE.

Joseph I., Emperor of Germany, the son of Leopold I.; born in Vienna, July 26, 1678. He succeeded his father in 1705. He was engaged nearly the whole of his reign in hostilities; and with England and Holland continued the war against France, to seat the Archduke Charles on the throne of Spain. The splendid victories gained by the allies under Marlborough in the Low Countries, and Prince Eugene on the Rhine, made the reign of Joseph remarkably brilliant. His arms were equally triumphant in Italy and Hungary; in the latter kingdom he drove the revolted Bagotzki from the country, and forced him to seek safety in Turkey; while in the Italian peninsula, his conquest was most complete; all the great cities from Mantua to Genoa were laid under heavy contributions. He died April 17, 1711.

Joseph II., Emperor of Germany; son of the Emperor Francis I. and Maria Theresa; born in Vienna, March 13, 1741. He was crowned King of the Romans in 1764; the year following he succeeded his father; and in 1780, by the death of the empress-queen, he succeeded to the crown of Hungary and Bohemia. In 1788, a declaration of war was published against the Turks, and the same year the emperor, in person, reduced Schabatz; but this was followed by a defeat of Prince Lichtenstein, who fell in the action. Soon after this a bloody battle was fought between the Imperialists and Turks on the heights of Rohadin, in which neither could claim the victory. Joseph next made an attempt to possess himself of Belgrade, but without success. But Marshal Laudohn taking on himself the command of the army, took Dubicza and Novi, and in 1789 reduced Belgrade, soon after which a peace was concluded, chiefly in consequence of the agitation caused in Europe by the French Revolution. He died in Vienna Feb. 20, 1790.

Joseph Emmanuel, King of Portugal; born in 1715. He was son and successor of Charles V., and ascended the throne in 1750. The great earthquake at Lisbon, in 1755, and the expulsion of the Jesuits from the kingdom in 1759, were the principal events of this reign, during which Joseph was assisted by his clever minister, the Marquis de Pombal. Learning was encouraged, commerce and industry received a fresh impulse, and the power of the Inquisition was diminished. He died in 1777.

Josephine, Marie Rose (zhō-zā-fēn'), Empress of the French; born in the island of Martinique June 23, 1763. Her father, Tascher de la Pagerie, was captain of the port of St. Pierre. When about 15 years of age she went to France, and in 1779 married Viscount Alexandre Beauharnais. A daughter of this marriage, Hortense, Queen of Holland, was the mother of the Emperor Napoleon III. Joséphine's husband was executed during the Reign of Terror, she herself just escaping. On March 9, 1796, she was married to Napoleon Bonaparte. She accompanied him in his Italian campaign and exercised a great influence in restraining him from measures of violence and severity. At Malmaison, and afterward at the Luxembourg and the Tuileries, she attracted round her the most brilliant society of France, and contributed not a little to the establishment of her husband's power. But her marriage with Napoleon proving unfruitful, it was dissolved by law, Dec. 16, 1809. She died in Malmaison, near Paris, May 29, 1814.

Joseph of Arimathea, a rich Israelite of high character, who seems to have been a member of the Great Council or Sanhedrim. He opposed the determination of his colleagues to bring about the death of Jesus, but did not openly profess himself a disciple from motives of fear. But the courage of his convictions came to him at the moment of the crucifixion, and on the evening of that day he went boldly to Pilate and begged the body of Jesus, burying it reverently in his own rock-hewn tomb. An ancient tradition makes him carry the GRAIL (*q. v.*) to Britain about the year 63 and settle at Glastonbury.

Joseph of Paris, commonly called FATHER JOSEPH, a famous Capuchin, who was employed by Cardinal Richelieu in most of his political intrigues. Louis XIII. procured him a cardinal's hat, but he died before he received it, in 1638.

Josephstadt (yō′zef-stät), one of the most important fortresses of the Austrian empire; situated at the confluence of the Mettau and the Elbe in Bohemia, 10½ miles N. by E. of Königgrätz.

Josephus, Flavius (-sē′fus), a famous Jewish historian; born in Jerusalem in A. D. 37. On his mother's side he was descended from the Asmonæan princes, while from his father, Matthias, he inherited the priestly office. He enjoyed an excellent education; and at the age of 26 he went to Rome to plead the cause of some Jewish priests whom Felix, the procurator of Judæa, had sent thither as prisoners. After a narrow escape from death by shipwreck, he safely landed at Puteoli; and being introduced to Poppæa he not only effected the release of his friends, but received great presents from the empress. On his return to Jerusalem he found his countrymen eagerly bent on a revolt from Rome, from which he used his best endeavors to dissuade them; but failing in this, he professed to enter into the popular designs. He was chosen one of the generals of the Jews, and was sent to manage affairs in Galilee. When Vespasian and his army entered Galilee, Josephus threw himself into Iotapata, which he defended for 47 days. When the place was taken, the life of Josephus was spared by Vespasian through the intercession of Titus. Josephus thereupon assumed the character of a prophet, and predicted to Vespasian that the empire should one day be his and his son's. Vespasian treated him with respect, but did not release him from captivity till he was proclaimed emperor nearly three years afterward (A. D. 70). Josephus was present with Titus at the siege of Jerusalem, and afterward accompanied him to Rome. He received the freedom of the city from Vespasian, who assigned him, as a residence, a house formerly occupied by himself, and treated him honorably to the end of his reign. The same favor was extended to him by Titus and Domitian as well. He assumed the name of Flavius, as a dependant of the Flavian family. His works are written in Greek, and are: "History of the Jewish War" (about A. D. 75); "Jewish Antiquities" (about A. D. 93); His own "Life" (not earlier than A. D. 97); "A Treatise on the Antiquity of the Jews," or "Against Apion." He died about A. D. 100.

Joshua, the name of four persons mentioned in the Old Testament (Josh. i: 1; I Sam. vi: 14–18; II Kings xxiii: 8; Hag. i: 1). The last-named Joshua is the Jeshua of Ezra v: 2. The earliest and most celebrated of the four, after whom the other three were named, was the son of Nun, an Ephraimite (I Chron. vii: 27), who first appears as commanding the Israelites by appointment of Moses during the fight with Amalek (Exod. xvii: 9, 10, 13). He was with Moses just after his descent from Sinai (xxxii: 17); he was then a servant of Moses, and a young man (xxxiii: 11). He was one of two spies who reported the practicability of conquering Canaan (Num. xiv.). Before the death of Moses Joshua was divinely named his successor and formally invested with authority (xxvii: 18). He afterward led the Israelitish host in the conquest of Canaan. He died at the age of 110, and was buried at Timnath-serah, in Mount Ephraim (Joshua xxiv: 30).

The Book of Joshua.— The 6th book of the Old Testament, immediately succeeding the Pentateuch in the Hebrew. The name appears to have been given because Joshua was the leading human personage in the book. It is naturally divided into three parts: first, the conquest of Canaan (i.-xii.); second, the partition of the land, or Jewish domesday book (xii.-xxii.); and third, Joshua's final address to the people (xxiii., xxiv.). The events recorded are considered to have occupied about 25 years, from 1451 to 1426 B. C. The expression "to this day" occurs 14 times in the book, once of Rahab's dwelling among the people (vi: 25), and apparently of the life of Caleb (xiv: 14). Hence, all but the concluding verses have been attributed to Joshua, or one of the elders who outlived him. Many Rationalists place it much later. Colenso resolves it, like the books of the Pentateuch, into various parts. One is an original story, which he dated in the later part of David's or the earlier part of Solomon's reign. A considerable part he attributes to the "Deuteronomist," whom he places in the reign of Manasseh, and he supposes a third portion to belong to what he terms the "Later Legislation," during the Captivity.

Josiah, King of Judah. He succeeded his father, Amon, 641 B. C., at the age of eight years. He destroyed the idols and restored the worship of the true God, established virtuous magistrates for the administration of justice, and repaired the temple. He also caused the law of Moses to be sought for and preserved. He was wounded in a battle fought at Megiddo against Necho, King of Egypt, and died in 610 B. C.

Jósika, Baron Nikolaus (yō′shē-ko), a Hungarian novelist; born in Torda, Transylvania, April 28, 1794. The scion of a rich and noble family, he received a finished education, entered the army, and at last became a man of letters. His first efforts were collected into a volume of "Sketches," and were greatly admired. As a writer of realistic and historic fiction he achieved fame with "The Poet Zrinyi," "The Last of the Bathory," "Abafi," and "A Hungarian Family during the Period of the Revolution." A profound student of the life, man-

ners, legends, and antiquities of his countrymen, gifted with a bewitching style, rich in invention and perennially enticing in his plots, he well merited the praises he won as "the Sir Walter Scott" of the land that gave him birth. He died in Dresden, Feb. 27, 1865.

Josquin des Prez (zhos-ka*ng'* dā prā), a Flemish composer; born in or near St. Quentin, Hainault, Belgium, about 1450. He received an appointment in 1475 in the papal chapel at Rome, latterly became chapel-master to Louis XII., and composed masses, motets, etc. He held a canonry in Condé, Hainault, where he died, Aug. 27, 1521.

Joss, the penates of the Chinese; every family has its joss. A temple is called a joss house.

Joss Stick, in China, a small reed covered with the dust of odoriferous woods, and burned before an idol.

Jost, Isaak Markus (yōst), a Jewish historian; born in Bernburg, Anhalt, Feb. 22, 1793. He was a Jewish schoolmaster at Berlin (1826–1835) and Frankfort-on-the-Main (1835–1860), and wrote "History of the Israelites" (1820–1829); "Recent History of the Israelites, 1815–1845" (1846–1847); "History of Jewry" (1857–1859). He also edited a German translation of the "Mishnah," with text and commentary (6 vols. 1832–1834). He died in Frankfort, Nov. 25, 1860.

Jotham, King of Judah, 758 B. C., son and successor of Uzziah, or Azariah. He appears to have been for some years regent before the death of Uzziah, his leprous father, but ascended the throne at the age of 25 years, and reigned 16 years.

Jötuns (yuh'töns), in Northern mythology, immense giants and magicians who had command over the powers of nature, and lived in dark caves in their kingdom of Jötunheim, from which they waged perpetual war against the Æsir, the bright gods of Valhalla. Originally they represented the destructive forces in nature. They were cunning, malignant, versed in witchcraft, but not highly intelligent.

Joubert, Barthélemy Catherine (zhō-bār'), a general of the French republic; born in Pont-de-Vaux, Ain, France, April 14, 1769. He served with distinction in Tyrol and Piedmont, succeeded Moreau in Italy in 1799, and when fighting against the Russians under Suwarrow was killed at the battle of Novi, Aug. 15, 1799.

Joubert, Joseph, a French moralist; born in Montignac, Périgord, May 6, 1754. The bulk of his epigrammatic work was published posthumously under the critical supervision of Châteaubriand and Raynal, the titles of the volumes being "Thoughts" and "Thoughts, Essays, Maxims, and Correspondence." He died in Paris, May 4, 1824.

Joubert, Léo, a French biographer; born in Bourdeilles, Dordogne, France, Dec. 13, 1826. He is skillful, accurate, and readable, as a miscellaneous biographical writer: and his best studies, "Washington and the Formation of the Republic of the United States of America" (1888), "Alexander the Great" (1889), and "The Battle of Sedan" (1873), are popular.

Joubert, Petrus Jacobus, a Boer military officer; born in Cango, Cape Colony, in 1834; received a rudimentary education; settled in the Walkerstroom district of the Transvaal in early manhood; was elected to the Transvaal Volksraad in 1863; acting president of the republic in 1874; appointed a member of the triumvirate of 1880 to conduct war against Great Britain. On Feb. 27, 1881, he surprised the British encampment with a small force and won a decided victory, which soon resulted in terms of peace. He was acting president of the republic again in 1883–1884; trained the Boer army in the tactics which proved so successful against the vastly superior British army sent against the Transvaal and Orange Free State in 1898. He died in Pretoria, March 27, 1900.

Jouett, James Edward, an American naval officer; born in Lexington, Ky., Feb. 27, 1828; was graduated at the United States Naval Academy in 1847; destroyed the Confederate war ship "Royal Yacht" in Galveston harbor in 1861; placed in command of the "Montgomery"; promoted lieutenant-commander in July, 1862; participated in the action at the entrance of Mobile Bay in 1864; directed the operations for the protection of American interests on the Isthmus of Panama during a rebellion in 1885; promoted rear-admiral, Feb. 19, 1886; retired, 1890; died Oct. 1, 1902.

Jouffroy, Théodore Simon (zhö-frwa'), a French philosopher; born in Pontets, Doubs, France, July 17, 1796. He became a pupil of Cousin, at Paris, and from 1817 onward taught philosophy at various educational institutions in Paris. Ill-health obliged him in 1838 to exchange his professorial chair for the post of librarian to the university. Jouffroy was not an original thinker and founded no school. His merit is that he was the lucid interpreter of the teaching of the Scotch philosophers Reid and Dugald Stewart; he translated their works, with critical introductions and notes. His own best books were: "Philosophical Miscellanies" (1833; new edition 1883); "Course in Natural Law" (1835); "Course in Æsthetics" (1843; new edition 1883). For some time Jouffroy was a member of the Chamber of Deputies; he was also well known as a journalist. He died in Paris, France, Feb. 4, 1842.

Jouffroy d'Abbans (dä-bo*ng'*), **Claude, Marquis de,** claimed by the French as the inventor of steam navigation; born in 1751. He served in the army, and in 1783 made a small paddle-wheel steamboat sail up the Rhone at Lyons — the connection between piston and paddle-wheel axle being rack-and-pinion. Compelled to emigrate by the revolution, he failed, on account of financial ruin, to float a company till after Fulton had made his successful experiments on the Seine in 1803. He died in 1832.

Jougs (jögz), an instrument of punishment formerly used in Scotland, consisting of an iron collar which surrounded the neck of the criminal, and was fastened to a wall or tree by an iron chain.

Joukovski. See ZHUKOVSKI.

Joule (named from the eminent English physicist, James P. Joule), in electricity, the unit of heat and work; the volt-coulomb.

Joule, James Prescott, an English physicist; born in Salford, England, Dec. 24, 1818. He studied under Dalton the chemist, made researches in electro-magnetism, about 1840 turned his attention to the subject of heat, and ultimately established the theory of the mechanical equivalent of heat. His published work consists mainly of papers read before the Royal Society, of which he was made a fellow in 1850, receiving its medal in 1852, and the Copley medal in 1870. He received in 1878 a civil list pension of $1,000 in recognition of his services to science. His most important achievement was that of settling the mechanical equivalent of heat, which established that the quantity of heat capable of increasing the temperature of one pound of water by 1° F., requires for its evolution the expenditure of mechanical energy represented by the fall of 772 pounds through the space of one foot. He died in Sale, Oct. 11, 1889. See JOULE'S LAW.

Joule's Law, a law which relates to the work done by an electric current in overcoming the resistance in the circuit. It is substantially as follows: In any circuit carrying a current I, in amperes, the heat energy developed, where R is the resistance of the portion of the current under consideration, equals I^2R. This formula expresses, in watts, the activity of that portion of the current. Now the activity of one watt indicates the development of .24 calories of heat each second; consequently a complete expression of the heat set free is $H = I^2 \times .24$ calories, equal to $IE \times .24$ calories a second. See JOULE, J. P.

Jourdan, Comte Jean Baptiste (zhör-do*ng'*), a French marshal; born in Limoges, France, April 29, 1762. He entered the army at 16, and, after seeing service in North America, rose under the republic to the rank of a General of Division. In September, 1793, he obtained the command of the Army of the North, and on Oct. 16 defeated the Austrians at Wattignies. In 1794 and 1795 he commanded the Army of the Meuse and Sambre, and with it gained the victory of Fleurus, June 26, 1794, drove the Austrians back across the Rhine, took Luxemburg, and laid siege to Mainz. But on Oct. 11, 1795, he was defeated at Höchst, and thus compelled to retreat over the Rhine. Crossing this river again in 1796, he penetrated as far as Bavaria, but was there beaten by the Archduke Charles at Amberg and Würzburg; this discomfiture made him resign his command. In 1799 the Directory intrusted him with the command of the Army of the Danube; but he was again defeated by the Archduke Charles at Ostrach and at Stockach. The First Consul employed him in 1800 in the reorganization and administration of Piedmont; and on the establishment of the empire in 1804 he was made a marshal and a member of the Council of State. In 1806 he was nominated governor of Naples, and afterward accompanied King Joseph Napoleon to Spain as chief of his staff. Louis XVIII. made him a count in 1819. But his republican principles led him to enter heartily into the revolution of 1830. He died in Paris, Nov. 23, 1833.

COMTE JOURDAN.

Journalism, the gathering and distributing of news and opinion by the medium of newspapers. It has come to be one of the most important professions of civilized life. While eloquent and learned disquisitions have been spoken and written on the "power of the press," but few realize its immense influence or comprehend that the business, politics, social science and religion of the world are largely carried on through the newspapers.

The first printed newspaper was called "The Gazette," and was published in Nuremburg in 1457. No copy of this has been

preserved. The oldest printed paper existing is the "*Neue Zeitung aus Hispanien und Italien*" (News from Spain and Italy), 1534, a copy of which is in the Nuremberg library. A weekly publication called the "Frankfurt Journal" was started by Egenolf Emmel in 1615. Thus Germany was first in the introduction of newspapers, as she had been in the art of printing. In 1622 a paper called "The Weekly News" was published in London. The first French paper, "Gazette of France," was started in 1631, and has, with few interruptions, continued to the present day. The first daily paper in France was issued in 1777. The official organ of Sweden, "Potosch Inrikes Tidning," was commenced in 1644; that of Holland, the "Haarlem Courant," in 1656, and the "St. Petersburg Gazette" in 1703. The first paper in Turkey was issued in 1827. The total number of newspapers published in the world in 1899 was estimated at about 50,000, distributed as follows: United States and Canada, 21,360; Germany, 6,000; Great Britain, 8,000; France, 4,300; Japan, 2,000; Italy, 1,500; Austria-Hungary, 1,200; Asia, exclusive of Japan, 1,000; Spain, 850; Russia, 800; Australia, 800; Greece, 600; Switzerland, 450; Holland, 300; Belgium, 300; all others, 1,000. Of these more than half are printed in the English language. The following are the oldest journals still in existence, with the date of their founding: Frankfort "Gazette," 1615; "Gazette de France," 1631; Leipsic "Gazette," 1660; London "Gazette," 1665; Stamford (Eng.) "Mercury," 1695; Edinburgh "Courant," 1705; Rostock "Gazette," 1710; Newcastle (Eng.) "Courant," 1711; Berlin "Gazette," 1722; Leicester (Eng.) "Journal," 1752; Dublin "Freeman's Journal," 1755.

The growth of newspapers in the United States has surpassed that of any other part of the world. The first American paper was published in Boston, Sept. 25, 1690. It was called "Publick Occurrences, both Foreign and Domestic," and consisted of three pages, two columns to a page, and one page blank. It was intended to be a monthly, but was suppressed on its first appearance. The Boston "News Letter," generally considered the first American paper, was commenced April 24, 1704, by John Campbell. It was a weekly, printed on a sheet of foolscap, sometimes on a half sheet, and existed 72 years, till the British troops evacuated Boston, 1776. Its circulation was 300. The Boston "Gazette" appeared in 1719. Philadelphia's first paper was published in 1719, and New York's first paper in 1725. The most important paper of Colonial times was the New York "Weekly Journal," issued in that city in 1733. Its editor, John Peter Zenger, was arrested for libel, the first case of the kind in the American courts. The oldest paper in New York, the "Commercial Advertiser," was founded by Noah Webster in 1793 under the name of the "Minerva." The first Western paper, called the "Sentinel of the Northwestern Territory," was founded by William Maxwell, in Cincinnati, 1793. The first national organ, the "National Intelligencer," was removed from Philadelphia to Washington in 1779. It had formerly been called the "Independent Gazetteer." It was followed by the "United States Telegraph." The "Union," 1852–1853, was the last official organ. The first religious paper, called "The Recorder," was issued at Chillicothe, O., 1814, the "Boston Recorder" appearing in 1816. The agricultural press was inaugurated by the "American Farmer," published in Baltimore in 1818, and the "Ploughboy" in Albany, 1821. The first successful commercial paper was the "New Orleans Prices Current," 1822. Since then all amusements, sciences, vocations and industries have had their own organs. None of the old style papers had a subscription list of over 5,000 and the prices were very high. The first cheap paper was started in 1832 by Horace Greeley, in connection with Horatio Shepard, but it did not prove a success. It was, however, speedily followed by others on the same line, such as the Baltimore "Sun," the New York "Herald" and the "Tribune," all of which reached a circulation of from 10,000 to 15,000. Of the leading New York newspapers the "Herald" was established in 1835 by James Gordon Bennett, the "Tribune" in 1841 by Horace Greeley, and the "Times" in 1851, by Henry J. Raymond. Most of the daily papers have eight pages, but the weeklies have from 16 to 24 pages, while the Sunday editions in the great cities often number 40 pages. Among the religious papers which have exerted a wide influence for good are the "Congregationalist," "Outlook," "Observer," "Christian Advocate," "Churchman," "Interior," "Advance," etc.

In 1837 reporters came into service and the sub-division and classification of editorial work began. In 1847 the Hoe press with its rapid work made a revolution in the press-room, and the following year the telegraph began to play an important part. In 1849 the New York Associated Press was formed. This was a combination of the leading papers of that city to facilitate the gathering of shipping news, and which has since been enlarged in its numbers and scope and has been followed by many similar combinations. In 1859 the stereotyping of newspaper forms by the paper-matrix process was introduced and the Bullock circular press came into use. In 1860 trade papers first made their appearance, and the manufacture of paper out of wood-pulp and straw greatly reduced

the cost of that heavy item of expense, and increased the circulation by lowering the price of newspapers. The New York "Tribune" was the first paper to use the Atlantic cable to report the news of the Franco-Prussian War, in 1870. The Civil War, 1861–1865, gave a new impetus to journalism. Correspondents were sent to the front to gain the latest news, and their letters were eagerly read. The papers, especially the weeklies, were profusely illustrated and from these sources more of history has been preserved than could have been done in any other way. In the last few years great progress has been made in journalism as in other things, and while the expense of running a newspaper has increased, the cost to its patrons has been lowered. The best dailies in the country sell for one or two cents, while the immense Sunday editions are but five cents. The American papers excel all others in their general makeup, attractive head lines, fine illustrations, spicy leaders and the variety and interest of their special articles. Women are largely employed on the staffs of all reputable journals, and have proved themselves as capable of filling even the most exacting assignments as men. Sensational, or "yellow," journalism as it is termed, while open to criticism, has its uses in calling attention to many needed reforms and awakening interest in public matters. Too great a license of the press works its own undoing, as has been seen in the downfall of certain editors and their publications. The Spanish-American War of 1898 called out the greatest possible enterprise and most lavish expenditure of money by our great daily papers. Dispatch boats were hired at an expense of from $1,500 a day to $8,000 and $9,000 a month, some papers employing as many as from 5 to 10 craft of various kinds. Some of these followed closely the fleets at Manila and Santiago, and were under fire during the hottest of the battle. Their dispatches sent from the ships and from the battlefields during action were wonderful word-pictures of the most picturesque war ever waged. It cost from 50 to 80 cents a word to send press matter from St. Thomas or Jamaica, and from $1.45 to $1.80 a word for press cables from Hong Kong. A correspondent of a New York paper paid $6,400 in American gold to get his description of the fight with Cervera to his paper. One editor had a weekly salary list, for war correspondents alone, of $1,463, and a single correspondent of another leading journal was paid $10,000 a year.

Journey Weight, a term applied at the English mint to the weight of certain parcels of coin, which were probably considered formerly as a day's work. The journey weight of gold is 15 troy pounds, which is coined into 701 sovereigns, or 1,402 half-sovereigns. A journey weight of silver weighs 60 pounds troy, and is coined into 792 crowns, or 1,584 half-crowns, or 3,960 shillings, or 7,920 sixpences.

Joust, a tilting match; a mock combat or conflict of peace between knights in the Middle Ages, as a trial of valor. The combatants used blunted spears, but were still subject to much danger from sudden blows on horseback. A joust differed from a tournament in that the latter was a conflict between many knights, divided into parties, and engaged at the same time; the joust was a separate trial of skill, where only one man was opposed to another.

Joux (zhö), a lake of Switzerland, canton of Vaud, near the Jura and the French frontier, and 18 miles S. E. of Lausanne; length, 7 miles; breadth, 1 mile. It is overlooked by Mont Tendre, which, on the S. E. attains an elevation of 5,730 feet above the level of the sea.

Joux, Chateau de (shä-tō′ duh), a fortress in the Jura Mountains, France, department of Doubs, commanding the route to Neufchâtel, 16 miles N. of the lake. It was successively the prison of Fouquet, Mirabeau, Toussaint l'Overture, and General Dupont.

Jouy, Victor Joseph Etienne, called **de** (zhö-ē′), a French librettist, dramatist, and descriptive writer; born in Jouy, near Versailles, France, in 1764. He entered on a military career in connection with the Revolution and the restoration, and wrote an opera libretto, "The Vestal," which won him a reputation. "Ferdinand Cortez" and "William Tell" came next, followed by "Sylla," a tragedy. "The Hermit of the Chaussée d'Antin" is his best prose work. He died in Paris, Sept. 4, 1846.

Jove, another name for JUPITER (*q. v.*).

Jovanovic, Jovan (yō-vän′ō-vitch), surnamed ZMAJ, a Servian poet, journalist, humorist, and dramatist; born in Neusatz, Nov. 24, 1833. He qualified as a lawyer, but went into journalism, winning fame throughout Austria and Hungary as editor and founder of influential political and satirical sheets. He was called "Zmaj" or the "Dragon," from the name of his most successful paper. The volume "Withered Roses" contains the finest verse, and his farce "Saran" is perennially popular on the Servian stage.

Jovellanos (Jove-Llanos), Gaspar Melchor de (hō-vel-yä′nōs), a Spanish dramatist; born in Gijon, Asturia, Jan. 5, 1744. His political and official career was not fortunate, though he filled high posts

with distinction. As a writer he was happy; applause greeting his tragedy of "Pelagius," founded on the fortunes of the famed Asturian king. His "Orations and Discourses" are the productions of a finished and talented rhetorician. He died in Viloga, Nov. 27, 1811.

Jovian (jō′vi-an), or **Jovianus** (-ā′-nus), **Flavius Claudius,** a Roman emperor; born about 332. He was elected by the soldiers, A. D. 363, after the death of Julian, whom he had accompanied in his campaign against the Persians. In order to effect his retreat in safety, Jovian surrendered to the Persians the Roman conquests beyond the Tigris. He was a Christian, but he protected the heathens. After a reign of but little more than seven months he died in Dadastara, Bithynia, Feb. 17, 364.

Jowett, Benjamin, an English scholar; born in Camberwell, London, England, in 1817. He studied at Oxford, was elected to a fellowship in 1838, and became Regius Professor of Greek in 1855. In 1855 he published a commentary on the Epistles of St. Paul. In 1860 appeared his essay on the "Interpretation of Scripture" in the celebrated "Essays and Reviews," for which he was tried on a charge of heresy before the chancellor's court, but was acquitted. In 1870 he became master of Balliol, and in 1871 published his most important work, a translation of the "Dialogues" of Plato. He publisned translations of Thucydides (1881) and the "Politics" of Aristotle (1885). In 1882 he was elected vice-chancellor of the university. He died Oct. 1, 1893.

Jovinianist (-vin′-), one of the followers of Jovinian, an Italian monk who lived in the 4th century. He taught that the Virgin Mary ceased to be a virgin by bringing forth Jesus; that the degrees of future blessedness do not depend on the merit of our good works; that celibacy and the maceration of the body are not required. His views were condemned at Rome and Milan in A. D. 338, and he and other persons were excommunicated. Afterward the Emperor Honorius banished him to the island of Boa.

Joyce, Robert Dwyer, an Irish poet; born in County Limerick, Ireland, in 1836. In 1866 he came to the United States. He was a versatile writer of ballads, songs, and sketches; and contributed to the "Pilot," etc. His best-known published works are: "Ballads, Romances, and Songs" (1872); "Deirdré," an epic poem, which appeared anonymously as one of the "No Name Series" (1876); "Legends of the Wars in Ireland" (1868); "Fireside Stories of Ireland" (1871); "Blanid," a poem (1879); "The Squire of Castleton." He died in Dublin, Oct. 23, 1883.

Joyeuse (zhwä-yuhz′), **Anne, Duc de,** admiral of France and favorite of Henri III., who distinguished himself by many gallant exploits; born about 1561. He was killed at the battle of Coutras in 1587.

Juan II., Don (Hö-än′), a natural son of Philip IV. of Spain, and of Maria Calderona, an actress; born in 1629; made grand prior of Castile; commanded the Spanish army in Italy in 1647 and took the city of Naples; subjugated Barcelona in 1652, but, being afterward unsuccessful, was exiled. Under Charles II. he was recalled to Madrid, made prime minister, and died in 1679.

Juan de Fuca (dā fö′kä), or **Fuca, Strait of,** the strait between Vancouver Island and the State of Washington on the W. coast of North America.

Juan Fernandez (fer-nän′deth), called also MAS-Á-TIERRA ("nearer the mainland"), a rocky island in the Pacific Ocean, 420 miles W. of Valparaiso, Chile, to which it belongs. It is 13 miles long and 4 broad, and is for the most part a series of rocky peaks of volcanic origin, the highest of which, Yunque, is 3,000 feet above sea-level. The trees are mostly ferns. The sandal-wood trees are nearly all exterminated. Horses, pigs, and goats run wild. The island was discovered by the Spaniard whose name it bears in 1563, and was frequently visited by buccaneers down to its occupation by the Spaniards in 1750. Here Alexander Selkirk, a buccaneer, a native of the Scotch fishing village of Largo, lived in solitude, 1704–1709. His story is supposed to have suggested the "Robinson Crusoe" of Defoe. When Spain lost her South American colonies Juan Fernandez fell to Chile which used it as a penal settlement, 1819–1835. It is usually inhabited by a few Chilean seal and sea-lion hunters; and in 1877 it was leased by the Chilean government to a Swiss, who established a small colony there.

Juarez, Benito (Hö-ä′reth), President of Mexico; born of Indian parents in Gueletao, Oaxaca, March 21, 1806. He became an advocate, and as governor of his native state (1847–1852) was distinguished both for his ability and his honesty. Exiled during the dictatorship of Santa Ana, he returned when the republic was restored, and in 1857 was elected president of the Supreme Court (equivalent to vice-president of the nation). On the overthrow of the Liberal president by the clerical party in 1858 Juarez assumed the executive, but was compelled to retire to Vera Cruz, where his government was recognized by the United States in 1859, and whence he issued decrees abolishing religious orders and confiscating Church property. In Jan-

uary, 1861, he was able to enter the capital, and in March was elected president for four years. In December of the same year the allied forces of England, France, and Spain occupied Vera Cruz; in April the British and Spanish withdrew, but the French remained, and declared war against Juarez, who retreated gradually to the N. frontier, and remained for nearly a year at El Paso del Norte. He entered Mexico city again in July, 1867, MAXIMILIAN (*q. v.*) having been shot meanwhile by order of court-martial. Juarez was again elected president for four years — years disturbed by repeated revolutionary attempts. In 1871 he was reëlected, and the risings became even fiercer and more frequent; but he faced all his foes with the dogged courage of his race, and was holding his position with unwearied energy when he died in Mexico, July 18, 1872.

Juba (jö'bä), a great river of Eastern Africa, which flows into the Indian Ocean at about lat. 0° 5′ S., and whose mouth marks the N. boundary of the coast placed under British control by the agreement with Germany in 1890. The river has been explored to beyond lat. 3° N., and Cecchi identifies the Umo as its upper waters; so that it probably takes its rise in the same mountains as the feeders of the Nile.

Juba (jö'bä), the name of two Kings of Mauritania and Numidia, important kingdoms of Northern Africa, prior to and after the fall of Carthage. JUBA I. flourished about half a century B. C., and, having declared for Pompey in the struggle for mastery among the first triumvirate, on the murder of Pompey, Cæsar invaded the kingdom of Mauritania, and Juba being defeated and compelled to fly, in despair fell on his sword 42 B. C. JUBA II., the son of the former, was carried prisoner to Rome while yet a youth, when Cæsar drove his father from the throne. On the fall of the second triumvirate, Augustus Cæsar, who had taken a strong regard for Juba, married him to one of Antony's daughters, Cleopatra, and restored him to his father's throne. Juba possessed great judgment and considerable learning, and left behind him "A History of Arabia," "Antiquities of Syria," and "A History of Rome," written in Greek. He died in A. D. 17.

Jubal, son of Lamech and Adah in the Genesis story, the inventor of the harp and organ, probably general terms for stringed and wind instruments. The meaning of the name is most likely significant, connected with *yobel*, "jubilee."

Jube, the rood loft in a cathedral or church, which parts the chancel from the choir, and which obtains its name from the custom of pronouncing the words, *Jube, Domine, benedicere,* from it in the Roman Catholic service before the lessons, which are also chanted there.

Jubilate, the 100th Psalm, which in the Vulgate begins *Jubilate Deo omnis terra.* It was added to the English Prayer-book in 1552, to be sung after the Second Lesson, instead of the *Benedictus,* when that canticle occurs in the chapter for the day; but it is used at other times as well, and always at thanksgivings.

Jubilee, properly the trumpet or horn blown in a certain year, or the sound it made; now used more generally for the year itself. It occurred every 50th year. Seven was a sacred number, and it became yet more so if multiplied by itself (7×7), after which came the jubilee. There was to be no tillage or harvest that year (Levit. xxv: 11, 12). Any descendant of those among whom Joshua partitioned the land who, from poverty, had parted with his property, was to receive it back (xxv: 13–34; xxvii: 16–24); and those Israelites who were the slaves of their brethren, or of foreigners resident within the land, were to go free (xxv: 39–54). The jubilee seems to be alluded to in Ezek, xlvi: 17; Isa. lxi: 1, 2; Neh. v: 1–19; see also Num. xxxvi: 4, 6, 7; I Kings xxi: 1–4; but no historic description, in the Bible or elsewhere, of a jubilee actually kept in a particular year has descended to our times. Also a feast first instituted in 1300 by Boniface VIII., who proposed that it should be celebrated at the commencement of each succeeding century; Clement VI. enacted that it should recur every 50 years, and Urban VI., in 1389, that it should be every 33 years. Paul II. reduced the period to a quarter of a century, and since his time there has been no alteration. A pilgrimage to Rome was the original condition of obtaining the indulgence promulgated at a jubilee, but latterly this has been commuted. There was no jubilee in 1800, the Holy See being vacant.

Juby (jö'bē), **Cape,** a cape on the W. coast of Africa, 100 miles S. of the frontier of Morocco, with an anchorage. A trading settlement of an English company was established in 1879–1889.

Juch, Emma Johanna Antonia (MRS. FRANCIS L. WELLMAN), an American singer; born in Vienna, Austria, July 4, 1863; brought to the United States in infancy; received a normal school education; made her début as an operatic singer at Her Majesty's Grand Italian Opera, London, in June, 1881; subsequently, organized the Emma Juch Grand English Opera Company which has made successful tours through the United States.

Judæa (-dē'ä), a term applied after the return of the Jews from exile to that part of Palestine bounded E. by the Jordan and

the Dead Sea, N. by Samaria, W. by the Mediterranean, and S. by Arabia Petræa. See PALESTINE.

Judah, the 4th son of Jacob and Leah, and the head of the tribe of that name. It was to Judah that Jacob declared that the scepter should not depart from it till the coming of the Messiah; a prediction fulfilled in the advent of Christ.

Judah, Kingdom of, a state — which was formed in reality on the death of Solomon and the secession of the Ten Tribes forming the kingdom of Israel — composed of the two remaining tribes of Benjamin and Judah. Infinitely smaller than its rival in territorial possessions, consisting of little more than 1-5 of the whole country of Palestine, and not, indeed, the whole of the province of Judea, yet in point of population it was nearly on a par in numbers with the 10 united tribes. The kingdom of Judah endured for 133 years after the destruction of its rival, and was brought to a close by Nebuchadnezzar, 588 B. C., who carried the vanquished inhabitants to Babylonia and distributed them beyond the Euphrates. After their return from captivity this tribe in some sort united in itself the whole Hebrew nation, who from that time were known only as Judæi, Jews, descendants of Judah. Judah — when named in contradistinction to Israel, Ephraim, the kingdom of the Ten Tribes, or Samaria — denotes the kingdom of Judah, and of David's descendants. One of the principal distinctions of this tribe is that it preserved the true religion and the public exercise of the priesthood, with the legal ceremonies in the temple at Jerusalem; while the Ten Tribes gave themselves up to idolatry.

Juda=Hakadosh, a famous rabbi in the time of the Emperor Antonius to whom he was preceptor. He is said to have been the original compiler of the Mishna, or the Talmudical text.

Judaism, one of the most important faiths of the world, which Christians, as well as Jews, consider to have been revealed by God.

Ancient Judaism.— The earliest form of the Jewish faith was patriarchal. On the night of the Israelitish departure from Egypt an essential part of Judaism, in its second or more developed form, was begun by the institution of the passover (Exod. xii., xiii.). At Sinai two tables of stone were given containing the 10 commandments. Subsequently there was revealed to Moses, to be by him communicated to the people, a complicated system of ceremonial observances, interspersed with judicial enactments. A splendid tabernacle — *i. e.*, a tent — on a divine model, was erected as the habitation of Jehovah, in the journeyings through the wilderness, to be in due time followed by a temple, when the people were permanently settled. A hereditary priesthood was consecrated, and a theocratic form of government maintained, the supreme civil ruler, whether lawgiver, military leader, judge, or king, being regarded as the vicegerent of God. Ancient Judaism was the precursor of Christianity and the germ from which it sprang; and Christians generally believe that all the ceremonies, sacred personages, etc. of the older economy were types and shadows of the life and sufferings of Jesus Christ (Heb. ix., x., etc.). Colenso, in common with some rationalistic writers, believes that what he terms the Levitical or Later legislation was never really put in force till after the Babylonish Captivity.

Modern Judaism.— After the Jews lost their independence, and especially after the destruction of Jerusalem the judicial regulations of the Mosaic law ceased to be observed. Tradition also gained increased authority, and in the latter half of the 4th century arose the Jerusalem, and in the 6th the Babylonian Talmud, containing the rules, constitutions, precepts, and interpretations intended to supplement those of the Old Testament. Notwithstanding these and other changes, modern Judaism still bears very considerable resemblance to the ancient type of the faith. See HEBREWS: JEWS.

Judas Iscariot, one of the 12 apostles, and betrayer of his master. He seems to have possessed the full confidence of his fellow-apostles, and was intrusted by them with all the presents which were made them, and all their means of subsistence; and when the 12 were sent out to preach and to work miracles, Judas appears to have been among them and to have received the same powers. For the paltry sum of about $15 he engaged with the Jewish Sanhedrim to guide them to a place where they could seize his Lord by night without danger of a tumult. But when he learned the result, a terrible remorse took possession of him; not succeeding in undoing his fatal work with the priests, he cast down before them the price of blood, crossed the gloomy valley of Hinnom, and hanged himself (Matt. xxvii: 3–10); or fell headlong and burst asunder (Luke xxii.; in Acts i: 18). Many interpreters suppose that the motive of his betrayal was to oblige Jesus, in self-defense, to announce Himself as the expected Messiah, to surmount the emergency by His miraculous powers, and to open to Himself, the apostles, and the Jewish kingdom, the anticipated career of aggrandizement.

Judas Maccabæus. See MACCABEES.

Judas, or **Jude,** brother of James, one of the 12 apostles. Matthew and Mark call

him Thaddæus surnamed Lebbæus. Nothing is known of his life.

The General Epistle of Jude.—A short epistle thought by many to have been penned by Jude. So much of Jude's epistle is like II Peter, that portions of the one seem to have been transcribed from the other. There is a slight probability in favor of the view that II Peter was the original and Jude the copy (see II Peter ii: 4, 6, 10, 11, 15, etc., with Jude 6, 7, 8, 9, 11, etc.). Eusebius placed it among his Antilegoumena, but the Council of Laodicea, about A. D. 360, and that of Hippo, A. D. 393, finally fixed it in the canon.

Judas' Tree, a genus of trees of the natural order *Leguminosæ*, sub-order *Cæsalpineæ*. The common Judas' tree is a native of the S. of Europe and of the warmer temperate parts of Asia. It has almost orbicular, very obtuse leaves. The flowers, which are rose-colored, appear before the leaves. There is a legend that Judas hanged himself on a tree of this kind. The American Judas' tree is very similar, but has acuminate leaves. The flower buds are frequently used in salads and pickled in vinegar. The wood of both species is very beautiful, veined with black, and takes an excellent polish. The young shoots of the American Judas' tree are used in domestic dyeing, and impart a fine color to wool.

Judd, Sylvester, an American novelist, and theologian; born in Westhampton, Mass., July 23, 1813; was graduated at Yale College in 1836; studied theology at Cambridge; and was ordained in 1840. His romance "Margaret" will always be remembered. "Richard Edney" is another romance; "Philo" is a striking poem; and his discourses on 'The Church" were esteemed. He died in Augusta, Me., Jan. 20, 1853.

SYLVESTER JUDD.

Jude. See JUDAS.

Judex, or Judicium. It appears that there was no class among the ancient Romans corresponding to our judges. The judices were not necessarily lawyers, and it would seem that any Roman citizen might act as a judex in civil causes. The judices were allowed to have their assessors, learned in the law, to advise with. A judex judged both of facts and law, but only in such cases as were of smaller importance. An arbiter determined what seemed equitable in a matter not sufficiently defined by law. The recuperatores were another class of judges, and were so called because by them everyone recovered his own. The centumviri were judges chosen from the 35 tribes, three from each; being in all 105, but named by a round number, 100. They formed a court in which weighty matters of the law were decided. The judicia were of two kinds, privata (private) and publica (public), the former being civil trials, having relation to differences between private individuals, the latter criminal trials. The Album Judicum was the body out of which judices were to be chosen.

Judge, a legal officer. In ordinary language, a civil officer invested with power to hear and determine causes, civil or criminal, and to administer justice in courts held for that purpose; or a person authorized or empowered in any way to decide a dispute or quarrel.

In Law.—The National and State systems of judicature in the United States comprise in their list of officers judges of various degrees of dignity and of widely variant functions. In most of the States the most numerous class are the presiding officers of courts of oyer and terminer, hustings courts, criminal courts, courts of correction, etc., the names given similar tribunals in the different commonwealths varying. They have in most instances both criminal and (to a certain extent) civil jurisdiction, but in other cases are restricted entirely to one or the other function. Of a higher dignity than these are the circuit judges, who in some commonwealths have large supervisory and reviewing powers, while the whole system is presided over by the judges of the supreme State courts. The United States judges range in dignity from district to supreme court officials. Judges are recipients of office in divers ways — some being elected by the people, others by the Legislature; and yet others are appointed by the President or by governors of the States.

Jewish History.—Judges were certain remarkable individuals raised up in Israel after the death of Joshua and prior to the establishment of the Jewish monarchy. At that time there was little unity among the tribes, each of which, like a Scottish Highland clan, looked up to its own individual chief, and not often to any higher human authority. Some judges owed their power to having been the first to rise against foreign oppression, which they overthrew; others discharged only peaceful functions. All acted in the Jewish theocracy as vicegerents of Jehovah. The series of events, oftener than once repeated, was first, that the people were seduced into idolatry; next,

that as a punishment for this they were conquered and placed under the yoke of a foreign oppressor; then a judge arose who under God set them free, and the land had rest normally for 40 years. The Hebrew name Shophetim sometimes means princes as well as judges. The functions of the judge in some respects resembled those of a Roman dictator, and in others those of a Mohammedan Mahdi. St. Paul considered the rule of the judges to have continued 450 years (Acts xiii: 20). A date apparently inconsistent with this (I Kings vi: 1) is believed to be an erroneous reading.

Judge Advocate, at stations of the army the officer through whom prosecutions before courts-martial are conducted. There is also a judge-advocate-general for the army at large; in the United States this is the title of the chief of the bureau of military justice at Washington.

Judge Lynch. See LYNCH LAW.

Judges, Book of, the 7th book in order of the Old Testament. It was named Judges because at the period to which it refers Israel was ruled by men of that designation (see JUDGE). It consists of five sections: a first introduction (i-ii:5), a second one (ii: 6-iii: 6), the main portion or consecutive narrative (iii: 7-xvi: 31), the first appendix (xvii-xviii.), and the second one (xix.-xxi.). Two authors seem to have been at work on it, each falling back on ancient documents. The first wrote i.-iii: 6, xvii-xxi, and the second iii: 7-xvi: 31. The first-mentioned writer never alludes to judges; it is he who uses the expression "in those days there was no king in Israel" (xvii: 6, xviii: 1, xix: 1, xxi: 25), implying that he did not write until kings had been appointed. If the "captivity of the land" (xviii: 30) be the Assyrian or even the Babylonish captivity the book is a late one though the Aramaisms in it are but few. It has been always accepted as canonical. In the New Testament it is referred to in Acts xiii: 20 and Heb. xi: 32.

Judgment, in law, a determination, decision, or sentence of a judge or court in any case, civil or criminal. In logic, the comparing together in the mind two of the notions, or ideas, which are the objects of apprehension, whether complex or incomplex, and pronouncing that they agree or disagree with each other, or that one of them belongs or does not belong to the other. Judgment is therefore affirmative or negative; as, Snow is white; all white men are not Europeans. In metaphysics, that faculty of the human mind by which judgments are formed. Kant defines it as "the faculty by which the particular is conceived as contained under the universal."

In Scripture, (1) Singular: (a) The sentence of a judge. (b) Justice (Is. xxxiii: 5). (c) The punishment which justice inflicts; specially, a calamity sent by God as a penal infliction on account of national or other sin (Exod. xii: 12; II Chron. xx: 9, xxii: 8). (2) Plural: The civil and criminal enactments of the Mosaic code, as distinguished from the ceremonial and the moral laws (Exod. xii: 12; Ps. cxix: 7, 13, 20, 39, 43, 62, etc.) Judgment of God, a term applied to several of the old forms of trial by ordeal, as single combat, walking upon red-hot plowshares, etc.

Judgment Creditor, one to whom a court of law has awarded a certain sum of money as damages, etc., payable by the other party in the case.

Judgment Day, in theology, the day on which God shall judge the world by the instrumentality of Jesus (Acts xvii: 31), meting out rewards and punishments as justice may require (Matt. xxv: 31–46). The fallen angels, as well as men, will be judged (Jude 6; Rom. xiv: 10; II Cor. v: 10). When 1,000 years from the birth of Christ were almost completed, it was generally believed that the judgment day was at hand, and every means was adopted to conciliate the Church and gain the favor of its Divine Lord. Among other steps adopted was to hand over estates as no longer needed to the ecclesiastical authorities, the reason assigned being thus expressed *Appropinquante mundi termino* (the end of the world being now at hand).

Judgment Debt, a debt secured to the creditor by a judge's order, and in respect of which he can at any time attach the debtor's goods and chattels. Such debts have the preference of being paid in full, as compared with simple contract debts.

Judicial Separation, in English law, by the Divorce Act of 1857, may be obtained, either by the husband or the wife, on the ground of adultery, cruelty, or desertion without cause for two years and upward, or by the wife, on conviction of the husband of aggravated assault. A judicial separation places the wife in the position of a "feme sole" during the continuation of the separation, and if she die intestate her property is dealt with as if her husband were dead. On the other hand her husband is in no way liable for her contracts or torts; but if he has been ordered by the court to pay her alimony, he will be liable for necessaries supplied to her if he have failed to pay her alimony. Neither can marry again during the life of the other. A divorce *a mensa et thoro* (from bed and board only) is granted in nearly all the States of the American Union.

Judiciary

Judiciary, that branch of the government which is concerned with the administration of justice, in cases civil or criminal; the system of courts of justice in a country; the judges collectively.

National.—Article III. of the Federal Constitution provides for the establishment of United States courts to have jurisdiction both in law and in equity. This jurisdiction is in general distinct from, but is sometimes concurrent with, that of the State courts. The system which Congress adopted at its first session remains unaltered in its essentials to the present time, except for the addition of the Court of Claims in 1855. The judges are nominated by the President and confirmed by the Senate. They retain office during good behavior. The judicial power of the United States is vested in a Supreme Court, Circuit Courts, 61 District Courts, and Courts of Claims. The Supreme Court has original jurisdiction only of "cases affecting ambassadors, other public ministers and consuls, and those in which a State shall be a party"; that is, only such cases can be commenced therein, but cases decided in the other Federal courts, under certain prescribed conditions, can be reviewed by the Supreme Court by virtue of its appellate jurisdiction. The limits of the original jurisdictions of the District and Circuit Courts, and the appellate jurisdiction of the latter over the former, are provided by law. Besides other matters, the Circuit Court has exclusive jurisdiction of patent suits and the District Court of admiralty cases. The Courts of Claims have jurisdiction of claims against the United States. The justices of the Supreme Court, besides their functions as such, are each assigned to one of the circuits, being then known as Circuit Justices. There is also a separate circuit judge for each circuit, and a district judge for each district. Circuit Courts may be held by the circuit justice, by the circuit judge or by the district judge sitting alone, or by any two of these sitting together. The judges of each circuit and the justice of the Supreme Court for the circuit constitute a Circuit Court of Appeals. As constituted at first, the Supreme Court consisted of a chief-justice and five associate justices, but the number of the latter has been changed from time to time, and there are at present eight. Besides these regular Federal courts, the Senate sits when necessary as a court of impeachment; the District of Columbia has a Supreme Court over which the Supreme Court of the United States has appellate jurisdiction; and Territorial Courts are provided, the judges of which are nominated for terms of four years by the President, and confirmed by the Senate, and over which the Supreme Court has also appellate jurisdiction. Cases decided in the highest court of any State may also be reviewed by the United States Supreme Court, but only when Federal questions are involved; that is, when the controversy deals with the Constitution, laws or treaties of the United States. Following is the National Judiciary for 1904, together with a complete list of the justices of the United States Supreme Court:

NATIONAL JUDICIARY.

SUPREME COURT OF THE UNITED STATES.

Chief-Justice of the United States—Edward D. White, of Louisiana, born 1845, appointed, 1910.

		Born.	App.
Asso. Justice—	John M. Harlan, Ky.	1833	1877
" "	Joseph McKenna, Cal.	1843	1898
" "	Oliver W. Holmes, Mass.	1841	1902
" "	William R. Day, Ohio.	1849	1903
Asso. Justice—	Horace H. Lurton, Tenn.	1844	1909
" "	Charles E. Hughes, N. Y.	1862	1910
" "	W. Van Devanter, Wyo.	1859	1910
" "	Joseph R. Lamar, Ga.	1857	1910

Reporter—Charles H. Butler, N. Y. Clerk—J. H. McKenney, D. C. Marshall—John M. Wright, Ky.

The salary of the Chief-Justice of the United States is $15,000; Associate-Justices, $14,500 each.

CIRCUIT COURTS OF THE UNITED STATES

Cir.	Judges.	App.
1.	Le Baron B. Colt, R. I.	1884
	William L. Putnam, Me.	1892
	Francis C. Lowell, Mass.	1905
2.	E. Henry Lacombe, N. Y.	1887
	Alfred C. Coxe, N. Y.	1902
	Henry G. Ward, N. Y.	1907
	Walter C. Noyes, Conn.	1907
3.	George Gray, Del.	1899
	Joseph Buffington, Pa.	1906
	William M. Lanning, N. J.	1909
4.	Nathan Goff, W. Va.	1892
	Jeter C. Pritchard, N. C.	1904
5.	Don A. Pardee, Ga.	1881
	A. P. McCormick, Tex.	1892
	David D. Shelby, Ala.	1890
6.	Horace H. Lurton, Tenn.	1893
	Henry F. Severens, Mich.	1900
	John W. Warrington, Ohio.	1909
7.	Peter S. Grosscup, Ill.	1899
	Francis E. Baker, Ind.	1902
	William H. Seaman, Wis.	1905
	Christian C. Kohlsaat, Ill.	1905
8.	Walter H. Sanborn, Minn.	1892
	Willis Van Devanter, Wyo.	1903
	William C. Hook, Kan.	1903
	Elmer B. Adams, Mo.	1905
9.	William B. Gilbert, Ore.	1892
	Erskine M. Ross, Cal.	1895
	William W. Morrow, Col.	1897

Judiciary

Salaries, $7,000 each. The judges of each circuit and the justice of the Supreme Court for the circuit constitute a Circuit Court of Appeals. The First Circuit consists of Maine, Massachusetts, New Hampshire, Rhode Island. Second—Connecticut, New York, Vermont. Third—Delaware, New Jersey, Pennsylvania. Fourth—Maryland, North Carolina, South Carolina, Virginia, West Virginia. Fifth—Alabama, Florida, Georgia, Louisiana, Mississippi, Texas. Sixth—Kentucky, Michigan, Ohio, Tennessee. Seventh—Illinois, Indiana, Wisconsin. Eighth—Arkansas, Colorado, Oklahoma, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wyoming. Ninth—Alaska, Arizona, California, Idaho, Montana, Nevada, Oregon, Washington, Hawaii.

UNITED STATES COURT OF CLAIMS

Chief Justice—Stanton J. Peelle, Ind. Associate Judges—Charles B. Howry, Miss.; Fenton W. Booth, Ill.; George W. Atkinson, W. Va.; Samuel S. Barney, Wis. Salaries, Chief Justice, $6,500; Justices, $6,000.

DISTRICT COURTS OF THE UNITED STATES—Salaries of District Judges, $6,000

Districts	Judges	Addresses	App.
Ala.: N. & M.	Thomas G. Jones	Montgomery	1901
" N.	William I. Grubb	Birmingham	1909
" S. D.	H. T. Toulmin	Mobile	1887
Alaska	Thomas R. Lyons	Juneau	1909
"	Alfred S. Moore	Nome	1906
"	Edw. E. Cushman	Valdez	1909
"	P. D. Overfield	Fairbanks	1909
Ark.: E. D.	Jacob Trieber	Little Rock	1901
" W. D.	John H. Rogers	Fort Smith	1896
Cal.: N. D.	John J. DeHaven	San Francisco	1897
"	Wm. C. Van Fleet	San Francisco	1907
" S. D.	Olin Wellborn	Los Angeles	1895
Colorado	Robert E. Lewis	Denver	1906
Connecticut	James P. Platt	Hartford	1902
Delaware	Ed. G. Bradford	Wilmington	1897
Fla.: N. D.	W. B. Sheppard	Pensacola	1908
" S. D.	James W. Locke	Jacksonville	1872
Ga.: N. D.	Wm. T. Newman	Atlanta	1886
" S. D.	Emory Speer	Macon	1885
Hawaii	Sanford B. Dole	Honolulu	1903
Idaho	Frank S. Dietrich	Boisé	1907
Ill.: N. D.	Ken. M. Landis	Chicago	1905
" S. D.	J. O. Humphrey	Springfield	1901
" E.	F. M. Wright	Urbana	1905
Indiana	A. B. Anderson	Indianapolis	1902
Iowa: N. D.	Henry T. Reed	Cresco	1904
" S. D.	S. McPherson	Red Oak	1900
Kansas	John C. Pollock	Topeka	1903
Ky.: W. D.	Walter Evans	Louisville	1899
" E. D.	A. M. J. Cochran	Maysville	1901
La.: E. D.	Rufus E. Foster	New Orleans	1909
" W. D.	Aleck Boarman	Shreveport	1881
Maine	Clarence Hale	Portland	1902
Maryland	Thomas J. Morris	Baltimore	1879
Mass.	Frederic Dodge	Boston	1905
Mich.: E. D.	Henry H. Swan	Detroit	1891
" W. D.	L. E. Knappen	Grand Rapids	1906
Minnesota	Chas. A. Willard	Minneapolis	1909
"	Page Morris	Duluth	1903
Miss.: N. & S.	Henry C. Niles	Kosciusko	1892
Montana	Wm. H. Hunt	Helena	1904
Mo.: E. D.	David P. Dyer	St. Louis	1907
" W. D.	John F. Philips	Kansas City	1888
Nebraska	Wm. H. Munger	Omaha	1897
"	Thos. C. Munger	Lincoln	1907
Nevada	E. S. Farrington	Carson	1907
N. Hamp.	Edgar Aldrich	Littleton	1891
New Jersey	Jacob Bellstab	Trenton	1909
"	Joseph Cross	Elizabeth	1905
N. Y.: N. D.	George W. Ray	Norwich	1902
" W. D.	John R. Hazel	Buffalo	1900
" S. D.	Geo. B. Adams	New York City	1901
" S. D.	George C. Holt	New York City	1903
" S. D.	Chas. M. Hough	New York City	1906
" S. D.	Learned Hand	New York City	1909
" E. D.	T. I. Chatfield	Brooklyn	1907
N. C.: E. D.	H. G. Conner	Wilson	1909
" W. D.	James E. Boyd	Greensboro	1901
N. Dakota	Chas. F. Amidon	Fargo	1897
Ohio: N. D.	R. W. Tayler	Cleveland	1905
" S. D.	A. C. Thompson	Cincinnati	1898
" S. D.	John E. Sater	Columbus	1908
Okla.: E. D.	R. E. Campbell	Muskogee	1908
" W. D.	John H. Cotteral	Guthrie	1908
Oregon	C. E. Wolverton	Portland	1906
"	Robert S. Bean	Portland	1909
Pa.: E. D.	J. B. McPherson	Philadelphia	1899
" E. D.	Jas. B. Holland	Philadelphia	1904
" M. D.	R. W. Archbald	Scranton	1901
" W. D.	Jas. S. Young	Pittsburgh	1908
" W. D.	Chas. P. Orr	Pittsburgh	1909
Rhode Island	A. L. Brown	Providence	1896

Judiciary

DISTRICT COURTS OF THE UNITED STATES—Salaries of District Judges, $6,000

Districts	Judges	Addresses	App.
South Carolina	W. H. Brawley	Charleston	1894
South Dakota	John E. Carland	Sioux Falls	1896
Tenn.: E. & M.	Ed. T. Sanford	Knoxville	1908
" W. D.	John E. McCall	Memphis	1905
Tex.: E. D.	D. E. Bryant	Sherman	1890
" W. D.	Thos. S. Maxey	Austin	1888
" N. D.	Edw. R. Meek	Dallas	1899
" S. D.	W. T. Burns	Houston	1902
Utah	J. A. Marshall	Salt Lake City	1890
Vermont	James L. Martin	Brattleboro	1906
Va.: E. D.	E. Waddill, Jr.	Richmond	1898
" W. D.	H. C. McDowell	Lynchburg	1901
Wash.: W. D.	C. H. Hanford	Seattle	1890
" W. D.	G. Donworth	Seattle	1909
" E. D.	Edw. Whitson	Spokane	1905
W. Va.: N. D.	A. G. Dayton	Philippi	1905
" S. D.	B. F. Keller	Bramwell	1901
Wis.: E. D.	Jos. V. Quarles	Milwaukee	1905
" W. D.	A. L. Sanborn	Madison	1905
Wyoming	John A. Riner	Cheyenne	1890

JUSTICES OF THE UNITED STATES SUPREME COURT

Name	Service: Term	Service: Years	Born	Died	Name	Service: Term	Service: Years	Born	Died
*John Jay,** N. Y.	1789-1795	6	1745	1829	Benj. R. Curtis, Mass.	1851-1857	6	1809	1874
John Rutledge, S. C.	1789-1791	2	1739	1800	John A. Campbell, Ala.	1853-1861	8	1811	1889
William Cushing, Mass.	1789-1810	21	1733	1810	Nathan Clifford, Me.	1858-1881	23	1803	1881
James Wilson, Pa.	1789-1798	9	1742	1798	Noah H. Swayne, Ohio.	1861-1881	20	1804	1884
John Blair, Va.	1789-1796	7	1732	1800	Samuel F. Miller, Iowa.	1862-1890	28	1816	1890
Robert H. Harrison, Md.	1789-1790	1	1745	1790	David Davis, Ill.	1862-1877	15	1815	1886
James Iredell, N. C.	1790-1799	9	1751	1799	Stephen J. Field, Cal.	1863-1897	34	1816	1899
Thomas Johnson, Md.	1791-1793	2	1732	1819	*Salmon P. Chase*, Ohio.	1864-1873	9	1808	1873
William Paterson, N. J.	1793-1806	13	1745	1806	William Strong, Pa.	1870-1880	10	1808	1895
John Rutledge, S. C.	1795-1795		1739	1800	Joseph P. Bradley, N. J.	1870-1892	22	1813	1892
Samuel Chase, Md.	1796-1811	15	1741	1811	Ward Hunt, N. Y.	1872-1882	10	1811	1886
Oliver Ellsworth, Ct.	1796-1800	4	1745	1807	*Morrison R. Waite*, Ohio.	1874-1888	14	1816	1888
Bushrod Washington, Va.	1798-1829	31	1762	1829	John M. Harlan, Ky.	1877-		1833	
Alfred Moore, N. C.	1799-1804	5	1755	1810	William B. Woods, Ga.	1880-1887	7	1824	1887
John Marshall, Va.	1801-1835	34	1755	1835	Stanley Matthews, Ohio.	1881-1889	8	1824	1889
William Johnson, S. C.	1804-1834	30	1771	1834	Horace Gray, Mass.	1881-1902	21	1828	1902
Brock. Livingston, N. Y.	1806-1823	17	1757	1823	Samuel Blatchford, N. Y.	1882-1893	11	1820	1893
Thomas Todd, Ky.	1807-1826	19	1765	1826	Lucius Q. C. Lamar, Miss.	1888-1893	5	1825	1893
Joseph Story, Mass.	1811-1845	34	1779	1845	*Melville W. Fuller*, Ill.	1888-1910	21	1833	1910
Gabriel Duvall, Md.	1811-1836	25	1752	1844	David J. Brewer, Kan.	1889-1910	20	1837	1910
Smith Thompson, N. Y.	1823-1843	20	1767	1843	Henry B. Brown,† Mich.	1890-1906	16	1836	
Robert Trimble, Ky.	1826-1828	2	1777	1828	George Shiras, Jr., Pa.	1892-1903	11	1832	
John McLean, Ohio.	1829-1861	32	1785	1861	Howell E. Jackson, Tenn.	1893-1895	2	1832	1895
Henry Baldwin, Pa.	1830-1844	14	1779	1844	*Edward D. White*,** La.	1893-		1845	
James M. Wayne, Ga.	1835-1867	32	1790	1867	Rufus W. Peckham, N. Y.	1895-1909	13	1837	1909
Roger B. Taney, Md.	1836-1864	28	1777	1864	Joseph McKenna, Cal.	1898-		1843	
Philip P. Barbour, Va.	1836-1841	5	1783	1841	Oliver W. Holmes, Mass.	1902-		1841	
John Catron, Tenn.	1837-1865	28	1786	1865	William R. Day, Ohio.	1903-		1849	
Peter V. Daniel, Va.	1841-1860	19	1785	1860	William H. Moody,‡ Mass.	1906-1910	4	1853	
John McKinley, Ala.	1837-1852	15	1780	1852	Horace H. Lurton, Tenn.	1909-		1844	
Samuel Nelson, N. Y.	1845-1872	27	1792	1873	Charles E. Hughes, N. Y.	1910-		1862	
Levi Woodbury, N. H.	1845-1851	6	1789	1851	Willis Van Devanter, Wyo.	1910-		1859	
Robert C. Grier, Pa.	1846-1870	23	1794	1870	Joseph R. Lamar, Ga.	1910-		1857	

*Names of the Chief-Justices in italics. **From December 12, 1910. †Retired May 28, 1906. ‡Retired November 20, 1910.

State.—The judicial systems of the several States are too widely different to permit of explanation. In some of them courts of equity are distinct from those of law, while in others the same tribunals exercise both functions, and in still others all distinction between actions at law and suits in equity is abolished. The manner of selecting judges also varies in different States and from time to time. At the period of the formation of the United States the election of judges by the people was unknown, except in Georgia. At the present time, however, the people elect judges in 24 of the States. Judicial terms vary from 2 to 21 years, the average being 10 years. The question has been much discussed whether the judiciary should be elective by the people, or appointive by the executive or Legislature, or "councils of appointment." Most of the States have decided in favor of the former, but many of these have found it necessary to lengthen in order to lessen the necessary evils of the system, which tends to supplant judicial justice by political shrewdness. The elective system seems to

have been a growth of the "spoils" doctrine as a means of rotation in office.

Judith, the 4th of the apocryphal books. The narrative opens with the "twelfth year in the reign of Nabuchodonosor, who reigned in Nineveh, the great city." That potentate, finding his armies thwarted in their progress to the W. resolved to take signal vengeance. His chief opponents were the Israelites, who fortified themselves in Bethulia. While Holofernes, his general, was besieging this stronghold, the heroine of the book, Judith, the beautiful widow of Manasses, went forth to the Assyrians, pretending that she had deserted her people. She fascinated Holofernes, who after a time took her to his tent, where, as he was lying drunk, she cut off his head, escaping back with it to the fort at Bethulia. On the loss of their leader the Assyrians fled, the Israelites pursuing and inflicting on them great slaughter. The book apparently professes to have been penned just after the events recorded (xiv: 10); but the earliest

JUDITH WITH THE HEAD OF HOLOFERNES.

known historic testimony to its existence is by Clement of Rome (Ep. i: 55), though it probably existed as early as 175 to 100 B. C. The ablest critics consider it a fiction rather than a genuine history.

Judson, Adoniram, an American missionary; born in Malden, Mass., Aug. 9, 1788; was graduated at Brown University in 1807 and studied theology at the Andover Theological Seminary. In April, 1810, he made application to the London Missionary Society to go to "India, Tartary, or any part of the Eastern continent." The offer of his services was favorably received and in February, 1812, he sailed with his wife for Asia. During the voyage he was converted from the Congregational faith to that of the Baptist Church. In 1814, when the Baptists of the United States organized a missionary union he was taken under its care. He settled in Burma; mastered the language; and labored there for nearly 40 years. During the last 25 years of his work there were about 20,000 conversions among the Karens. He was the author of a Burman grammar; a Pali dictionary, a Burman dictionary; and a complete Burman Bible. He died at sea, April 12, 1850.

Judson, Edward, an American clergyman; born in Moulmein, Burma, Dec. 27, 1844; son of Adoniram Judson; came to the United States in 1850; was graduated at Brown University in 1865; Professor of Latin at Colgate University in 1867–1874; pastor of the First Baptist Church of Orange, N. J., in 1875–1881. He then went to the Berean Baptist Church of New York city, and later built the Judson Memorial Church. In 1911 he was also Professor of Pastoral Theology at Colgate University,

Judson, Emily Chubbuck (FANNY FORRESTER), an American missionary and writer; born in Eaton, Madison co., N. Y., Aug. 22, 1817. She wrote: "Charles Linn" (1841); "The Great Secret" (1842); "Allen Lucas" (1843); "Alderbrook" (2 vols. 1846); "The Kathayan Slave" (1853). Her poems appeared as "An Olio of Domestic Verses" (1852). Among her other works are: "Trippings in Author Land" (1846); "My Two Sisters" (1854); and a memoir of "Mrs. Sarah B. Judson" (1850). She married Adoniram Judson in 1846. She died in Hamilton, N. Y., June 1, 1854.

Judson, Harry Pratt, an American educator; born in Jamestown, N. Y., Dec. 20, 1849; became head Professor of Political Science in the University of Chicago in 1892, and President in 1907. Works: "Cæsar's Army, a Study of the Military Art of the Romans" (1888); "Europe in the Nineteenth Century"; "The Growth of the American Nation."

Juel, Niels (yö'el), a Danish admiral; born in Copenhagen, May 8, 1629. He served in the Dutch navy under Tromp and De Ruyter against the English and the Moors of Barbary; entered the Danish service in 1656; was made admiral; took the island of Gothland from the Swedes in 1676, and defeated them the following year in the famous sea fight in the bay of Kjöge. He died in Copenhagen, April 8, 1697.

Juggernaut, in Hindu mythology, one of the 1,000 names of Vishnu, the second god of the Hindu triad. Juggernaut is Vishnu, especially in his 8th incarnation, Krishna. The great seat of his worship is at Pûrî, in Orissa, where he is associated with his brother Balbhadra, Baldeo, or Bal-

aram, and their sister Sabhadra. The idols have no legs, and only stumps of arms; the heads and eyes are very large. The two brothers have arms projecting horizontally from the ears. They are wooden busts about 6 feet high. Balaram is painted white, Juggernaut black, and Sabhadra yellow. Juggernaut's car is 43½ feet high. It has 16 wheels, each 6½ feet in diameter. The brother and sister have also cars. There are 13 festivals each year. The chief is the Rath Jattra, or Car Festival, at which the three idols are brought forth, being dragged out in their cars by the multitudes of devotees. Formerly a few fanatics threw themselves beneath the wheels; this is not now permitted. The Rev. Dr. Stevenson believes that the permission of all castes to eat together at Juggernauth, though nowhere else, and the alleged preservation of a bone of Krishna within the Juggernauta idol, raise the suspicion that the worship of this divinity is of Buddhist rather than of Brahminical origin. The present temple of Juggernaut was completed in 1198, at an expense of nearly $2,500,000. Its base is 30 feet square, its altitude above the platform on which it stands 180 or above the ground 200 feet. Two stone walls inclose it, the inner 445 and the outer 650 feet square. The British obtained possession of it in 1803. They found that the pilgrims had paid a tax to the Mahrattas. In 1806 the Anglo-Indian British government, under Sir George Barlow, took the pilgrim's tax and directed the worship of the temple. In 1839 the pilgrim's tax was abolished and the temple expenses fixed at a certain sum paid from public revenue. In June, 1851, the government ceased to have any connection with the temple.

Juglandaceæ (-dā′se-ē), the walnut tribe, a natural order of exogenous plants, chiefly found in North America. They are trees with alternate pinnate stipulate leaves, and unisexual flowers, the males in catkins, the females in terminal clusters or loose racemes. Besides the walnut the order includes the butternut and hickory. Many species are valuable for their timber.

Jugurtha (-gur-thä), King of Numidia, son of Mastanabal, who was a natural son of Masinissa. He was carefully educated with Adherbal and Hiempsal, the sons of his uncle Micipsa, who succeeded Masinissa on the throne. After Micipsa's death Jugurtha soon caused Hiempsal to be murdered (118 B. C.), whereupon Adherbal fled to Rome. Jugurtha succeeded in bribing great part of the Roman Senate, and obtained a decision in his favor, freeing him from the charge of the murder of Hiempsal, and assigning him a larger share of the kingdom than was given to Adherbal (117 B. C.). But Jugurtha soon invaded Adherbal's dominions, and, notwithstanding injunctions by the Romans to the contrary, besieged him in the town of Cirta (112 B. C.), and caused him and the Romans who were captured with him to be put to death with horrible tortures. Thereupon war was declared against Jugurtha by the Roman people; but, by bribing the generals, Jugurtha contrived for years to baffle the Roman powers. He was finally delivered up to the Romans, and was carried in the triumph of Marius, Jan. 1, 104 B. C., and then flung into a dungeon to die of hunger. Our interest in Jugurtha is due to Sallust's "Jugurthine War."

Jujuy (HÖ-HWĒ′), the extreme N. province of the Argentine Republic; a mountainous tract, bounded on the W. and N. by Bolivia; area 18,977 square miles; pop. (1905) 56,544. Its minerals are rich, but not worked to any extent. The chief industries are agriculture and cattle-raising; sugar and wheat are the principal crops. The exports (mainly to Bolivia) consist of cattle, mules, fruit, chicha brandy, skins, gold-dust, and salt. Capital Jujuy, on the San Francisco river, 44 miles N. of Salta; has a custom-house, national college, girls' normal school, sugar houses and refineries; pop. about 6,000.

Jukes, Joseph Beete, an English geologist; born near Birmingham, England, Oct. 10, 1811. He was graduated at Cambridge, in 1836; in 1839 appointed geological surveyor of Newfoundland; in 1842 took part as naturalist in the exploration and survey of Torres Strait, New Guinea, and the E. coast of Australia; surveyed part of North Wales for the Geological Survey of the United Kingdom (1846–1850); in 1850 became local director of the survey in Ireland. He also lectured on geology in the Museum of Irish Industry and at the Royal College of Science in Dublin, and wrote: "Excursions in and about Newfoundland" (1842); "Narrative of the Surveying Voyage of H. M. S. 'Fly,' in Torres Strait, etc." (1847); "A Sketch of the Physical Structure of Australia" (1850); "Student's Manual of Geology" (1857, 5th ed. 1890); etc. He died in Dublin, Ireland, July 29, 1869.

Julep, in medicine, a demulcent, acidulous, or mucilaginous mixture. Also a fancy beverage composed of whisky, brandy, or other spirituous liquor, mixed with sugar, crushed ice, and sprigs of young mint; called also mint-julep.

Jülg, Bernhard (yülg), a German philologist; born in Ringelbach, Baden, Aug. 20, 1825; studied classical and comparative philology at the universities of Heidelberg and Berlin; and after teaching in gymnasia at Heidelberg, Freiburg, and Rastatt became in 1851 Extraordinary Professor of Classical Philology at Lemberg; in 1853 ordinary professor at the University of Cracow, and in 1863 at Innsbruck. Of his scientific publications the most important are Vater's "Literature of the Grammars, Dictionaries,

and Collections of Words of All the Languages of the Earth" (2d edition, 1847); "Tales of the Siddhi-kur" (1866); two collections of Mongolian tales (1867 and 1868); a work on echoes of the Greek heroic epos among the Mongolians (1869); and "State and Problem of Philology" (1868). He died in Innsbruck, Aug. 14, 1886.

Julia, the daughter of Cæsar and Cornelia, the most virtuous and accomplished lady of Rome; she was twice married, first to Cornelius Scipio, and secondly to Pompey the Great, whom she attended to Egypt, and beheld from the deck of her galley his treacherous murder.

Julia, the daughter of Augustus Cæsar, and as universally execrated for her gross licentiousness and profligacy as the other Julia was renowned for her chastity. She was thrice married, though the list of her lovers was beyond calculation; on which account her father banished her from Rome. Her first husband was Metellus, her next Agrippa, and her last Tiberius Cæsar, who, when he attained the purple, allowed her to die of starvation. She had a daughter equally infamous.

Julia, a virgin martyr of Carthage. When that place was taken by Genseric she was sold to a heathen merchant and carried into Syria. Refusing to take part in the festivals instituted in honor of the female deities, she was put to death about 440.

Juliacum. See JÜLICH.

Julia Domna, second wife of the Emperor Severus, and mother of Caracalla and Geta, distinguished as the patroness of arts and sciences; born in 170. She died in 217.

Julia Gens, one of the most ancient patrician houses at Rome, of Alban origin, and removed to Rome by Tullus Hostilius on the destruction of Alba Longa. It claimed descent from the mythical Iulus, the son of Venus and Anchises. The most distinguished family of the gens was that of Cæsar.

Julian, or **Julianus, Flavius Claudius,** surnamed THE APOSTATE, Roman emperor; born in Constantinople, probably Nov. 17, 331. He was the youngest son of Constantine the Great, and was educated in the tenets of Christianity, but apostatized to paganism. In 354 he was declared Cæsar, and sent to Gaul, where he obtained several victories over the Germans; and, in 361, the troops in Gaul revolted from Constantius and declared for Julian. During the lifetime of his cousin Constantius he made profession of the orthodox faith; but on succeeding to the throne he threw off all disguise, reopened the heathen temples, and sought to restore the heathen worship in all its splendor; while he labored both by his pen and authority to destroy Christianity. He took from the Christian churches their riches, which were often very great, and divided them among his soldiers. He sought likewise to induce the Christians, by flattery or by favor, to embrace paganism; but failing in the attempt he shut up their schools, prohibited the followers of that religion from teaching grammar and rhetoric, and published an edict that the name of Christian should be abolished. His malice was further evinced by extraordinary indulgence to the Jews, and an attempt to rebuild the temple at Jerusalem, that the prophecy of Christ might be falsified; but it is said that flames of fire rose from beneath and consumed some of the workmen, by which miraculous interposition the design was frustrated. He did not long survive his disappointment, being killed in 363 in his expedition against the Persians.

JULIA DOMNA.

Julian, Cardinal; born in 1398; was deputed by Pope Eugene IV. to counsel Ladislaus, King of Hungary, to break the peace concluded with Amurath II. A long and disastrous war was the result, during which the Christian army was defeated at Varna, in 1444. He presided at the council of Basle.

Julian Epoch, the epoch or commencement of the Julian calendar. The first Julian year began with Jan. 1, 46 B. C., and the 768th from the year assigned to the foundation of Rome.

Julian Period, a period of 7,980 years, produced by multiplying 19 (the lunar cycle) by 28 (the solar cycle), and 15 (the Roman indiction). It began 4,713 years before the Christian era.

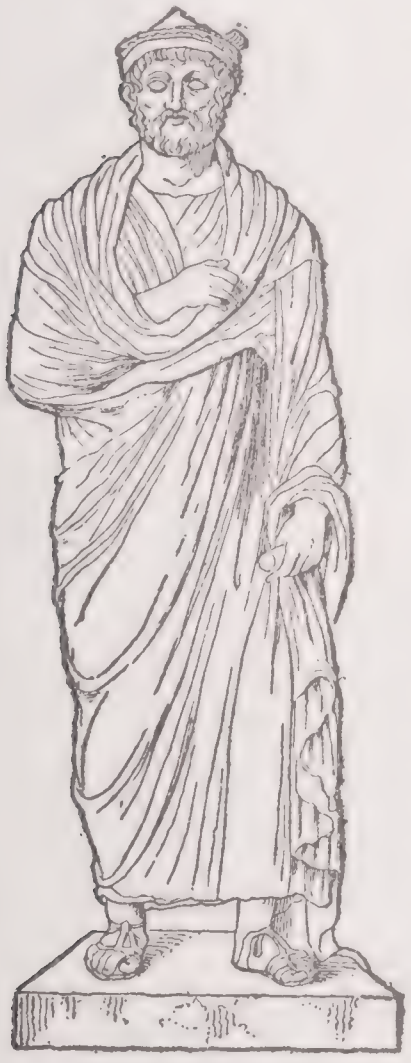
Julien, Stanislas Aignan, a French Sinologue; born in Orleans, France, Sept., 1799. He early acquired a wonderful knowledge of languages, and in 1821 was appointed assistant to Professor Gail, of the College of France. In 1832, on the death of M. Abel Rémusat, Julien succeeded to the vacant chair, and in 1839 was elected a member of the Académie des Inscriptions, He received numerous foreign decorations, and was the author of a translation from the Chinese of Kang-ing-Pien, or "The Book of Rewards and Punishments"; "History of the Life of Hiouen-Tsang and His Travels" (1853); "Memoirs on Western

Countries" (1859); "Art of Making Porcelain" (1856); etc. He died in Paris, France, Feb. 14, 1873.

Jülich (yü'li*h*), a town of Rhenish Prussia, on the Roer, 20 miles N. E. of Aix-la-Chapelle, the Juliacum of the Romans. Till its fortifications were razed in 1860 it ranked as a fortress of the second class. From the 12th century Jülich was the capital of an independent countship, created a duchy in 1356. In 1801 the duchy was annexed to France, in 1814 to Prussia. Pop. about 6,000.

Julius I., Pope, succeeded to the papal see on the death of Mark in 337, and is celebrated for the part he took in the Athanasian Controversy. He died in 352.

Julius II. (Giuliano della Revere), Pope; born in Albezuola, in 1443. He was nephew of Pope Sixtus IX., bishop successively of several sees, last of Avignon, and in 1471 became cardinal. He had been exiled by Alexander VI., but had influence to procure the election of Pius III., in September, 1503, and on his death, a month later, succeeded him. His pontificate was almost wholly occupied with wars. He recovered part of the Romagna from Cesare Borgia, Bologna from the Bentivoglio, and Perugia from the Baglioni. Against the Venetians, who held part of the Romagna, he concluded, in 1508, the iniquitous League of Cambray, with the emperor, Louis XII. of France, and the King of Aragon, and also published a terrible bull. After much fighting the Venetians submitted, and he made peace with them in 1510. He then made war on the French, to drive them out of Italy; conducted in person the siege of La Mirandola, and took it in 1511; saw his army defeated at Bologna, and the city again in the hands of the French, and was compelled to retire to Rome. A council being convoked at Pisa by the King of France, Julius convoked another at Rome; excommunicated Louis XII., and put his kingdom under an interdict in 1512; and died early in the following year. He was a friend of the rising literature of the time. The rebuilding of St. Peter's at Rome was commenced by Julius II. after the design of Bramante; and Michael Angelo and Raphael were among the great artists who found in him a patron. He died Feb. 21, 1513.



JULIAN THE APOSTATE.

JULIUS II.

Julius III., previously known as CARDINAL DEL MONTE, was chamberlain to Julius II., whose name he consequently assumed. He took little part in public business, but led a life of indolence at the villa still known by his name. Died in 1555.

Jullien, Louis Antoine (zhü-ly*ong'*), a French composer and director; born in Sisteron, Basses Alpes, France, April 23, 1812. He studied at Paris, and became a conductor of concerts there in 1836; but leaving in 1838, made London his headquarters, and did much to popularize music in England by means of large bands, the best available players and singers, and the most attractive pieces, including his own "Monster Quadrilles." He visited the United States in 1852–1854; became bankrupt in 1857, and retired to Paris, where he was imprisoned for debt, and died in a lunatic asylum near Paris, March 14, 1860.

Jullunder, a city of the Punjab, India; in the Doab or rich alluvial plain of the same name between the Sutlej and the Beas. The soil of the neighborhood is very productive; and the city, though fallen from its former greatness, in 1901 had 67,735 inhabitants. Jullunder is a very ancient city,

founded before Alexander's invasion of India, and is referred to in the "Mahábhárata." It gives its name to an administrative district (area 1,433 square miles; pop. 907,583), and to a division (area 19,400 square miles); pop. (1901) 4,307,100.

July, the name of the 7th month of the year. It formed the 5th month of the old Roman year, and was called Quintilis by the Romans; but shortly after the calendar had been rearranged by Julius Cæsar, the name Julius was given to this month by Mark Antony, in honor of Cæsar, whose birthday fell on it. It contains 31 days.

Jumboseer (-sēr′), a town of Hindustan, province of Gujerat, presidency of Bombay, on a river of same name, 35 miles N. W. of Baroda. It carries on a considerable trade with Bombay, to which it sends cotton, grain, oil, and cloth. Pop. about 12,000.

Jumet (zhü-mā′), a town of Belgium, province of Hainault, three miles N. of Charleroi; has glass-works, distilleries, and extensive coal mines; pop. (1890) 23,927.

Jumièges (zhü-myāzh′), **Robert of,** Archbishop of Canterbury. He was a Norman by birth, and went to England in the train of Edward the Confessor, over whom he acquired great influence. He was made Bishop of London in 1044, and Archbishop of Canterbury in 1050, and from the first was the head of the anti-English party which gained a temporary triumph in 1051 by the banishment of Earl Godwin and his sons. Their return next year quickly drove him into exile in Normandy. The Witenagemot stripped him of his archbishopric, and he spent the remainder of his life in the monastery of Jumièges, 16 miles S. W. of Rouen.

Jumièges, William of, a Norman monk who compiled in Latin a history of the Dukes of Normandy from Rollo down to 1071, which is of some value in the contemporary part — the story of the Conquest and early reign of William I.

Jumna (jum′-), a river of Hindustan, which rises in the Himalayas, in the native state of Garhwal, near Jamnotri, at the height of 10,849 feet. It flows in its upper course in a generally S. W. direction, then bends to the S. E., and passing the cities of Delhi and Agra falls into the Ganges at Allahabad, after a course of 860 miles. Some trade is carried on by means of clumsy barks. Two important irrigation works — the Jumna Eastern and the Jumna Western Canals, derive their supply of water from this river.

Jumpers, a class of religious fanatics, so named from their practice of jumping during the time allotted for divine service. They arose in Wales in 1760.

Jumping Deer, *Cervus lewisii,* a kind of deer found W. of the Mississippi; called also the black-tailed deer.

Jumping Hare, a species of jerboa found in Southern Africa, and so named from its general resemblance to a hare, while its jumping mode of progression, necessitated by the elongated nature of the hind legs, has procured for it its specific and popular distinction.

Jumping Mouse, found in Labrador and North America generally, but especially an inhabitant of the fur territories. Like the jumping hare, it is classified by some with the jerboas, and is one of the smallest of these forms.

Junagarh (jö-na-gar′), capital of a native state (area 3,283 square miles; pop., 1891, 380,921) of India, in the Bombay presidency; on the peninsula of Kathiawar, N. W. of Bombay. One of the most picturesque towns in India, it has an old citadel, which contains several Buddhist caves, as does also the ditch surrounding it; pop. (1891) 31,640.

Junceæ, or **Juncaceæ,** the rush order, a small natural order of endogenous plants, so named from the typical genus *Juncus.* It is principally composed of obscure herbaceous plants with brown or green glumaceous hexandrous flowers, the perianth being in two series, as in *Liliaceæ,* but calycine instead of petaloid. Some of them, as the common rush, are employed for making mats, chair bottoms, and brooms.

June, the 6th month of the year in our calendar, but the 4th among the Romans. It consisted originally of 26 days, to which four were added by Romulus, one taken away by Numa, and the month again lengthened to 30 by Julius Cæsar, since whose time no variation has taken place. During this month the sun leaves the sign of Leo and enters that of Cancer.

June, Jennie. See CROLY.

Juneau, a town and shipping port in Alaska; on a promontory between Linn Channel and the Taku river, opposite Douglas Island, and about 55 miles N. E. of Sitka. It had a population of about 1,400 in 1896, which was largely increased in 1897 by the thousands of gold seekers bound for the Yukon river gold fields. See ALASKA: KLONDIKE.

June Berry, a North American wild tree (*Amelanchier canadensis*) common in Canada and the United States, and allied to the medlar. The fruit is pear-shaped, about the size of a large pea, purplish in color, and

a good article of food. Service-berry and Shadbush are other names.

Jung, Johann Heinrich (yöng), generally called JUNG STILLING, a German writer; born in Im-grund, Nassau, Germany, Sept. 12, 1740. At first he pursued his father's callings, tailor and village schoolmaster; in 1768 he became a student of medicine at Strasburg, where he was intimate with Goethe, who admired his simple, pure, affectionate nature; he settled in 1772 as a medical practitioner at Elberfeld, and won fame as an operator for cataract; subsequently he held the professorship of Political Economy at Marburg (1787–1804) and Heidelberg. Though he wrote some semi-mystical, semi-pietistic romances, and later in life works on political economy, he deserves to be remembered for his charming autobiography, "H. Stilling's Youth," etc. He died in Carlsruhe, April 2, 1817.

Jung, Sir Salar, chief minister to the Nizam of Haidarabad; born in 1829. He succeeded his uncle as chief minister, and in 1853 at once began to reorganize the administration of the state. He reduced to obedience the mercenary Arab soldiery; then the robber chiefs of the hill districts were crushed; courts of justice were established at Haidarabad; the police force was organized; the construction and repair of works of irrigation were attended to; and schools were established. During the Mutiny of 1857 he adhered to British interests in face of the opposition of the people, who sided with the insurgents. On the death of the Nizam Afzul in 1869 Sir Salar Jung shared with the most powerful noble of Haidarabad the post of regent. In 1876 he visited England. He was a Knight Grand Commander of the Star of India. He died Feb. 8, 1883.

Jung Bahadur, Sir, prime-minister to the Maharajah of Nepal; born in 1816. During the Mutiny of 1857 he showed his friendly feeling to the British by sending a body of Ghurka troops to their assistance. Jung Bahadur was knighted and received a Grand Cross of the Star of India. He died Feb. 25, 1877.

Jungaria, Dzungaria, or **Sungaria,** a country of Central Asia, forming part of the Chinese empire; bounded N. and W. by Russia, E. by the Chinese province of Kansu, S. by East Turkestan; area 147,950 square miles; pop. 600,000. It is an elevated and almost desert plateau between the Altai and Thian-Shan Mountains, and is intersected by subordinate ranges. Between the mountains are several fertile valleys watered by numerous lakes and cultivated by nomadic tribes. Millet and barley are the chief agricultural products; gold, silver, and iron are found in considerable quantities, and salt abounds in the lakes and mines. The country was originally inhabited by the Oo-Sun, distinguished from neighboring nations by their blue eyes and red beards. They were expelled by the Turks in the 6th century and became subject to the Mongols. In 1754 the country was conquered by China, and has since been administered as a province of that empire, though a portion is claimed also by Russia.

Jungermannia (-man'-), a Linnæan genus of cryptogamous plants, containing a great number of species, which some modern botanists have divided into many genera, and some have even formed into an order, *Jungermanniaceæ*, though it is more generally regarded as constituting a sub-order of *Hepaticæ*. The distinctive characters of the sub-order are that the spore-cases open by four valves, and that the spores are mixed with elaters. The species much resemble mosses in appearance. Many are natives of Great Britain, some of them very common in moist places. The tropical species are very numerous, and some of them are to be found even on the young shoots and leaves of plants.

Jungfrau (yöng'frou) ("The Maiden"), a magnificent peak of the Bernese Alps; height 13,671 feet. It received its name either from the unsullied purity and dazzling brightness of the snow by which it is covered, or from the fact that no traveler had ever reached its highest point. Its summit was first ascended by two Swiss gentlemen, named Meyer, in 1811. On Sept. 18, 1898, the first section of the Jungfrau railway, to the Eiger glacier, including a tunnel of 88 yards, was opened, and it was announced that the summit of the Jungfrau would be reached by 1904, when it was intended to erect an observatory. The steepest gradient encountered was estimated at 25 per cent. Electric energy is used, not only for motive power, but for lighting and heating and for working the rock drills.

Junghans, Sophie (yöng'häns), a German novelist; born in Cassel, Dec. 3, 1845. Her literary career began with the production of short stories and verses; with the appearance of "Käthe, the Story of a Modern Maid," and "The House of Eckberg," a study of life during the Thirty Years' War, she attracted attention. Her novels while analytical and perspicuous where plot is concerned, are strong in style and interesting in incident; "The American (Woman)," "A Riddle," "An Heiress Against her Will," and others, exemplifying these qualities preëminently.

Jungle, a term adopted into the English literature from Bengal (Sanskrit *Jangala*, "desert") and employed to designate those thickets of trees, shrubs, and reeds which abound in many parts of India,

and particularly in the unhealthy tract called Terai or Tarayani, along the S. base of the Himalaya, and in the Sundarbans at the mouth of the Ganges. The jungles are often impassable, from the thick growth of underwood, tall grasses, and climbing plants. The soil is generally swampy, and fever and other diseases abound. Tigers and other beasts of prey, elephants, boars, deer, and other quadrupeds may be found in great numbers in these thickets, with gigantic snakes and multitudes of monkeys. The jungle flora and fauna are very peculiar, and the moisture and heat carry a tropical vegetation beyond its usual limits N. to the lower valleys of the Himalaya. See BENGAL: INDIA.

Jungle Cat, *Felis chaus,* a wild cat, of a yellowish-gray, inclining to reddish above and white below the muzzle and the limbs, with dark stripes, and the tail ringed with black; found in India and Africa.

Jungle Fever, remittent fever, which is apt to attack Europeans and others who pass through East Indian jungles (forests) during the rainy season, called also, by Anglo-Indians, hill fever.

Jungle Fowl, the name given in India to the wild species of *Gallinæ* (*Gallus ferrugineus*) which is the parent of our domestic fowl, and to three other closely allied species. See POULTRY.

Juniata River, a stream in Pennsylvania, formed near the center of the State by the junction of the Little Juniata and Frankstown branch, flowing in a generally E. course and emptying into the Susquehanna 14 miles above Harrisburg. It is about 150 miles long, and though not navigable is noted for its picturesque scenery. Beside it are the Pennsylvania canal and railroad, the latter crossing the stream many times.

Juniperus (-nip′-), a genus of plants, order *Pinaceæ.* The European species, *J. communis,* the common juniper, is a bushy shrub with evergreen sharp-pointed leaves. It grows in all the N. parts of Europe, in fertile or in barren soils, on hills or in valleys, on open sandy plains, or in moist and close woods. It abounds in the Alpine region of Switzerland. All parts of the plant, when bruised, exhale a more or less agreeable terebinthinate odor. The fruits and young tops are used in medicine, having stimulant and diuretic properties. The volatile oil (*oleum juniperi*), obtained from the fruits and other parts by distillation with water, is officinal in our pharmacopœias. The fruits or berries are used to flavor gin and Hollands. Turpentine is frequently substituted for them in the preparation of gin. Juniper wood has a reddish color, and is used occasionally for veneers. The species *J. Oxycedrus* yields, by dry distillation, the tarry oil known in France as *huile de cade;* it is principally used in veterinary medicine. The timber of this species is very durable. *J. Bermudiana* is the red or pencil cedar, and *J. Virginiana,* the Virginian red cedar. The wood of these species is used for pencils; that of the former is considered the best. *J. Sabina,* the common savin, is a native of the midland parts of Europe, and forms a small bushy shrub. The young branches, which are completely enveloped in the small imbricated leaves, are officinal in our pharmacopœias. They, and the oil obtained from them, have acrid, stimulant, diuretic, emmenagogue properties. In large doses they are irritant poisons, and have been frequently taken to cause abortion. Savin ointment is a useful acrid application to keep open blistered surfaces.

Junius's (jö′-) **Letters,** letters published in the London "Public Advertiser" under the signature of "Junius," the first appearing Jan. 21, 1769, and the last, making the 69th, in January, 1772. The first authorized edition, printed under the author's inspection, was published in London, March 3, 1772, and was issued with an index in March, 1773. The letters of Junius were directed against the ministry and the public characters connected with it, and excited the greatest public interest. The purity of their language, the force and perspicuity of their argument, their studied and epigrammatic sarcasm, dazzling metaphors, and fierce personal attacks obtained for them a popularity which perhaps no other series of letters ever possessed, and arrested the attention of the government as well as the public. Not less startling was the intimate and minute knowledge which they evinced of court secrets, showing an intimate acquaintance not only with ministerial measures and intrigues, but with every domestic incident. Every effort was made by the government to discover the author of these letters, but in vain. Since that time many volumes have been written on the subject (the last one, in 1870, by Mr. Chabot); nearly 50 persons have been credited with the authorship of the celebrated letters; but, though the strongest case appears to be in favor of Sir Philip Francis, the question is far from being a settled matter. See FRANCIS, SIR PHILIP.

Junk, a vessel employed by the Chinese, Japanese, and Malays in navigating their seas. It is the largest kind of Chinese vessel. It has no prominent stem or keel. The bow on deck is square, and the anchors are on each side of the bow. The stern is full, the rudder suspended, and at sea is lowered beneath the depth of the bottom of the vessel. The immense masts are in one piece; the lug-sails are sometimes of matting.

Junk=Ceylon, or **Salangan,** an island at the S. E. extremity of the Bay of Bengal, on the W. coast of the Malay peninsula, from which it is separated by a narrow channel; 25 miles long, about 10 broad. It is hilly and fertile, and well adapted for producing coffee and indigo, and has numerous herds of buffaloes, hogs, and deer. Pop. about 5,000, consisting of a mixture of Malays, Chinese, Siamese, and Birmans.

Junker, Wilhelm (yöng'ker), a German traveler; born of German parents in Moscow, Russia, April 6, 1840. He studied medicine in Göttingen, Berlin, and Prague. Proceeding to Tunis and Egypt, in 1874, he in 1876–1878 made a series of explorations among the W. tributaries of the Upper Nile, going as far S. as the Kibbi, a feeder of the Welle. In 1879 he started from Cairo on his second and more important journey, his object being to explore the basin and course of the river Welle-Makua, which he followed down to lon. 22° 47′ 40″ E. and lat. 3° 13′ 10″ N. This river was eventually (end of 1887) proved by Captain Van Gèle to be identical with the Ubangi, a right-hand affluent of the Kongo. After spending four years among the Monbuttu and Niam-Niam, Junker prepared to return home, but was prevented from getting back to Egypt by the Mahdi's revolt, and had to remain with Emin Pasha and Casati. But in 1886 he made his way to the coast through Karagwe, and reached Cairo again in January, 1887. He published "Travels in Africa" (1889), and died in St. Petersburg, Russia, Feb. 13, 1892.

Junkers (yöng'kurz), the name commonly given to the younger members of the nobility of Prussia and the adjoining states. "Junkerthum" was a term of reproach used in the middle of the 19th century to designate the party of reaction in Prussia, which found its most strenuous supporters among the nobility.

Junketing, any trip, excursion, or entertainment participated in by an official at public expense under the guise of public service; popularly called a "junket." The investigating tours of Congressional and Legislative Committees, which involve large railroad and hotel bills, are frequently given this name.

Junks, large flat-bottomed vessels, from 100 to 150 tons burden, used by the Chinese. They have three masts, and a short bowsprit placed on the starboard bow. The masts are supported by two or three shrouds which at times are all carried on the windward side. On the fore and main mast is a sort of lug-sail, of cane or bamboo. Similar to these junks are the Japanese barks, which are 80 or 90 feet long on one deck, but have only one mast.

Juno, in Roman mythology, a celebrated deity, identified with the Hera of the Greeks, and generally regarded as the daughter of Saturn and Rhea, and sister and wife of Jupiter. The principal seats of her worship were Argos, Samos, Carthage, and afterward Rome. The hawk, goose, and particularly the peacock, often called *Junonia avis* (the bird of Juno), were sacred to her. She presided over marriage and childbirth, and as the goddess of all power and empire, and the patroness of riches, is represented sitting on a throne with a diadem on her head and a golden scepter in her right hand. The Roman consuls, when they entered on office, were always obliged to offer her a solemn sacrifice. The public finances were also under her care, and the mint at Rome was in her temple. In astronomy, the name of an asteroid in proximity to Ceres.

JUNO.

Junot (zhü-nō'), **Andoche, Duc d'Abrantès,** one of Napoleon's generals; born in Bussy-le-Grand, Côte-d'Or, France, Oct. 23, 1771. He entered the army as a volunteer in 1792, and distinguished himself in the early wars of the republic. His courage at Toulon caught the eye of Napoleon, and he carried him with him to Egypt as adjutant. At Nazareth he covered himself with glory by putting to flight 10,000 Turks with but 300 horse. In 1804 he was made governor of Paris, and, after a short stay as ambassador in Lisbon, was appointed in 1807 to the command of the army for the invasion of Portugal. In a short time by his rapidity and skill he made himself master of all the strong places in the kingdom. For his brilliant success he was created Duc d'Abrantès, and appointed governor of Portugal; but he squandered the fruits of his victory by his absurd prodigality, and was ere long so severely defeated by Wellington at Vimiera that he was obliged to conclude a convention at Cintra and retire from Portugal. He subsequently served in Germany and Russia, and was made one of the scapegoats for the great Russian disaster and sent to govern Illyria. This, added to the effect of former wounds in the head, brought on mental derangement. He died near Dijon, July 29, 1813. His wife, Laurette de Saint-Martin-Permon (1874–1838), the accomplished and recklessly extravagant Duchesse d'Abrantès, gained a

reputation in the literary world by her "Memoirs" (1831–1835), and by several minor works.

Junqueira Freire, Luiz José (Hön-kāy′-rä frāy′rā), a Brazilian poet; born in Bahia, Dec. 31, 1832. He manifested a spiritual purity of mind and heart that drew the attention of his religious instructors while he was yet a boy; and at 19 he took religious vows, but almost immediately learned that he had mistaken his vocation. He obtained a release from his vows in three years' time, after a period of such agony of soul that we owe to it the most profoundly moving verses in which the breaking of a human heart is recorded — his "Inspirations of the Cloister." The regret and the delight of his country, he died at 23, in Bahia, June 24, 1855.

Junta (Spanish = an assembly), in Spain, a high council of state; it was originally applied to an irregularly summoned assembly of the states, as distinguished from the Cortes or Parliament regularly called together by the authority of the king. In Cuba the term was adopted by the insurgents to designate the general legation of the Cuban republic abroad. This legation or junta was first appointed Sept. 19, 1895, by the Constituent Assembly that formed the insurgent Cuban government, which at the same time made T. Estrada Palma head of the junta and chief Cuban representative abroad, with authority to appoint ministers to all governments and to have control of Cuba's diplomatic relations and representatives throughout the world. The junta established its headquarters in New York, and during the American-Spanish War was the organization through which the insurgents' friends outside of the island communicated with the Cubans in the field.

Junto, The, an English Whig ministry in the reign of William III., the chief members of which were Admiral Russell, Somers, Lord Wharton, and Montague, the great financier. This was the first ministry ever made of one and the same party politics. It was the suggestion of Robert, Earl of Sunderland, to William III., who shrewdly said, if all the ministers were of one party they would pull together, and if that party represented the majority they would be able to pass their measures. Also a club formed by Benjamin Franklin for mutual improvement. Morals, politics, and natural philosophy, as well as the social well-being of man, were the main subjects discussed. It continued for about 30 years.

Jupati (jö-pä-tē′) **Palm,** *Raphia lædigera,* a fine Brazilian palm. The leaf-stalks, which are 12 to 15 feet long, are used for building houses and making baskets.

Jupiter, in Roman mythology, the supreme Roman deity, identified with the Greek Zeus. He was the son of Saturn and Rhea. Jupiter was the king and father of men, but his power extended over the deities also; and everything was subservient to his will except the Fates. From him mankind received their blessings and miseries; they looked on him as acquainted with everything past, present, and future. The oak was sacred to him, because he first taught mankind to live on acorns. His most famous temple was at Elis, in Olympia, where, every 4th year, the Olympic games were celebrated in his honor; and

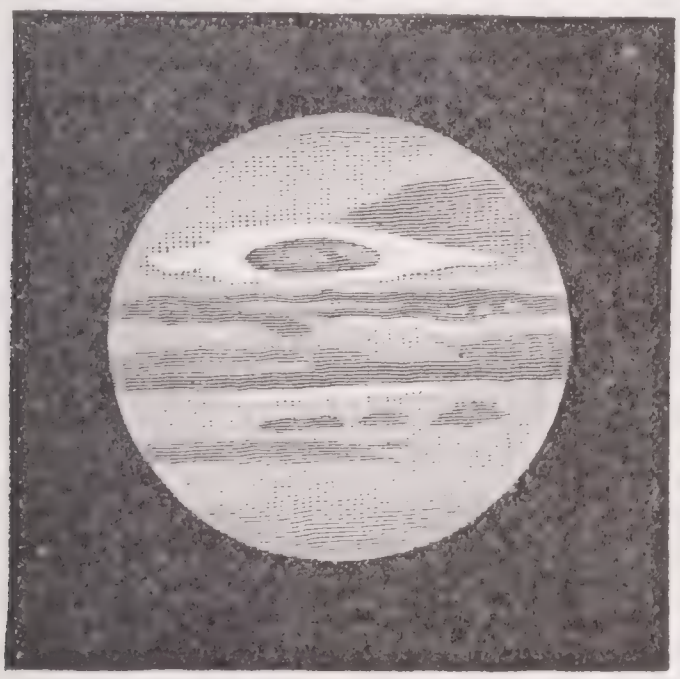
JUPITER.

his most favorite oracle was at Dodona, in Epirus. The Romans considered Jupiter as the especial patron of their city. He is generally represented as sitting on a golden or ivory throne, holding in one hand thunderbolts ready to be hurled, and in the other a scepter of cypress, while the eagle stands with expanded wings at his feet. White, the color of the day, was sacred to him. For Jupiter Ammon, see AMMON.

In astronomy, the largest planet of the solar system. Its diameter at the equator is nearly 90,000 miles, and the distance from pole to pole is over 84,000 miles. Its bulk is 1,300 times that of the earth, but its density is only one-fourth that of the earth. The average distance of Jupiter from the sun is 483,000,000 miles; and a railway train traveling 50 miles an hour, would require nine centuries to go from the sun to

Jupiter. The latter body revolves on its axis in about 9 hours and 55 minutes, which is the length of its day and night. Though traveling in its orbit round the sun at the rate of 28,743 miles an hour, it takes nearly 12 years to complete its revolution; this, therefore, is the length of its year. It is surrounded by four conspicuous belts of a brownish-gray color, two N., two S. of the equator, with feebler ones toward the poles. The equatorial region of the planet is brighter than the rest. Jupiter now has eight satellites, four of which were discovered by Galileo in 1610, and the others by later astronomers, including Professors Barnard (1892), Perrine (1905), and Melotte (1908).

Those discovered by Galileo are usually known by their numbers, which proceed in order of distance from the planet. If named they are called Io, Europa, Ganymede and Callisto. The first revolves round the planet in 1 terrestrial day, 18 hours



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and 28 minutes; the second in 3 days, 13 hours, 14 minutes; the third in 7 days, 3 hours, 43 minutes; the fourth in 16 days, 16 hours and 32 minutes. Barnard's satellite is called "Fulmen." It is much smaller than any of the others and revolves around Jupiter in 11 hours, 57 minutes and 23 seconds.

Jupon, a sleeveless overcoat, composed of several thicknesses of material sewed through, and faced with silk or velvet, on which were embroidered the wearer's arms. It fitted closely to the body, and, descending below the hips, terminated in an enriched border of various patterns; with it was worn the military belt, on which much ornament was lavished.

Jura. See HEBRIDES.

Jura (zhü-rä′), a Department in the E. of France, bordering on Switzerland; area 1,928 square miles; pop. (1906) 257,725. A large part is covered by the JURA (*q. v.*) Mountains, and it is drained by the Ain and the Oignon. The pastures are both extensive and rich, and the cattle reared on them, together with their dairy produce (including Gruyère cheese), form the chief source of wealth. Iron is worked, marble and alabaster abound, and there are salt springs in different quarters, from which salt is made. Capital, Lons-le-Saulnier.

Jura (jö′rä), a range of mountains of a peculiar limestone formation, oölitic in composition, and generally called Jurassic, which extends from the angle formed by the Rhone and the Ain, in a N. E. direction (with a gradually declining elevation) for more than 450 miles, to the upper course of the Main. But it is usual to restrict the name to the ranges that lie along the frontier of Switzerland and France — mainly in the departments of Doubs, Jura, and Ain. These constitute a plateau about 155 miles long by 40 wide, with an average height of 2,000 to 2,500 feet. The loftiest peaks are Reculet (5,643 feet), Crêt de la Neige (2,653), Mont Tendre (5,512), and Dôle (5,507). The E. face is much steeper than the W. The ranges are broken by numerous transverse gorges or "cluses." Many roads and railways traverse the chains, some of them of great strategic importance. Limestone caves are numerous, and they abound in magnificent stalactites and in the bones of extinct animals. Some rivers of considerable size sink into the ground and reappear after some distance, as the Orbe, the Doubs, and the Creuse. Fine pine forests are a characteristic feature of the scenery.

Jurassic System, the name given by geologists to what is termed in England the Oölitic system of strata, being very characteristic of the Jura Mountains; and also used in a wider sense to include both the Oölite and Lias.

Juratory Caution, in Scotch law, a kind of caution sometimes offered in a suspension or advocation, where the complainer is not in circumstances to offer any better. It consists of an inventory of his effects, given up upon oath, and assigned in security of the sums which may be found due in the suspension.

Jurisdiction, in ordinary language and law: (1) The legal power, right, or authority of administering justice; the legal power which a court of equity has of deciding cases brought and tried before it; the legal right by which judges exercise their authority; judicial authority over a cause. (2) The power or right of governing or legislating; the power or right of exercising authority, or of making and enforcing laws. (3) The extent to which

such authority extends; the district within which such power may be exercised. Appellate jurisdiction, jurisdiction in cases of appeal from inferior courts. Original jurisdiction, the legal right of hearing and determining a case in the first instance.

In Roman Catholic theology, ecclesiastical jurisdiction is defined as the "power which is concerned with the worship of God and the salvation of souls, and is exercised *in foro externo* as well as *in foro interno*." By commission from the Supreme Pontiff, whose powers, theologians teach, are derived from Christ through Peter, are constituted legates, patriarchs, primates, and prelates; by law or canon, rectors of universities, superiors of convents, provosts, and vicars-general receive their jurisdiction; and a jurisdiction exercised without challenge for 40 years is valid by prescription. To absolve a penitent, jurisdiction is necessary. Secular priests obtain this from their bishops; but confessors belonging to the regular orders have jurisdiction from the Pope over all the faithful when they have obtained the approbation of the bishop. A penitent *in articulo mortis* may be validly absolved, even in reserved cases, by a simple priest, even if degraded, apostate, or irregular. In ordinary cases, absolution given by a priest without jurisdiction is void.

Jurisprudence, the science of law; the knowledge of the laws, customs, and rights of men in a community, necessary for the due administration of justice. General jurisprudence, the science or philosophy of positive law. Particular jurisprudence, the knowledge of the law of any particular nation. Medical jurisprudence, see FORENSIC MEDICINE: MEDICAL JURISPRUDENCE.

Jury, a number of men selected according to law, impaneled, and sworn to inquire into and to decide on facts, and to give their true verdict according to the evidence legally laid before them. In courts of justice there are three kinds of juries, grand juries, special juries, and petit or common juries. (See GRAND JURY.) Petit or common juries and special juries consist of 12 men each, and the verdicts given must be unanimous. They are appointed both in civil and criminal cases. A special jury is resorted to in cases of too great importance to be decided by a petit jury. After the evidence in a cause has been given, and summed up by the judge, the jury retire to consider their verdict, and in order to avoid delay and abuses are kept without drink, fire, or light, unless by permission of the judge. In Scotland the number of the jury in criminal cases is 15, and the verdict is determined by the voice of the majority. It has been much disputed whether the germ of the modern jury system was of Anglo-Saxon or Norman origin. Those who hold the former view attribute it to King Alfred, of England, about A. D. 886. It does not seem to have been closely connected with the appointment of 12 compurgators for canonical purgations. The establishment of proper jury trials seems to have been under Henry II., late in the 12th century. It was well rooted in the time of King John, and is insisted on in Magna Charta as the great bulwark of liberty. In 1353, under Edward III., juries impaneled to try aliens were to consist half of foreigners. Various laws have since been passed on the subject of juries, but the changes made have not been of essential importance.

Also a body of men selected to award prizes at public shows, exhibitions, etc. To hang a jury, to cause a disagreement of opinion and prevent the return of a verdict.

Jusserand, Jean Jules (zhüs-ro*ng'*), a French historian and diplomat; born in Lyons, France, Feb. 18, 1855; entered public service in 1878; was chancellor of the French Embassy in London in 1887–1890; Minister to Denmark in 1899–1902; and succeeded Jules Cambon as Ambassador to the United States in 1903. In his literary work he made a specialty of the Elizabethan age, and of the literature of England in the Middle Ages. Works: "The English Theater, from the Conquest to the Immediate Predecessors of Shakespeare," "The Novel in the Time of Shakespeare," "The English Novel," "A Literary History of the English People," etc.

Jussieu, Adrien de (zhü-syuh'), a French botanist; son of A. L. de Jussieu; born in Paris, France, Dec. 23, 1797. He was educated for the medical profession, but devoted himself to science. In 1826 he succeeded his father as Professor of Botany; and though he wrote no large work on the science he contributed a great number of valuable memoirs relative to it to the scientific annals of France. He also contributed to the "Natural History" of Milne-Edwards. He was a member, and afterward president, of the French Academy of Sciences. He died in Paris, June 29, 1853.

Jussieu, Antoine de, a French botanist; born in Lyons, France, in 1688. After traveling over Europe he settled at Paris, where he became a member of the Academy of Sciences, and Professor of Botany in the Royal Garden. Besides several valuable papers on botany and mineralogy, the result of observations made during his travels, he wrote the appendix to Tournefort's "Institutions of Botany," and abridged Barrelier's work on the plants of France, Spain, and Italy; he was likewise

the author of a "Discourse on the Progress of Botany." Died in 1758.

Jussieu, Antoine Laurent de, a French botanist; nephew of B. de Jussieu; born in Lyons, France, April 12, 1748. He was the greatest philosopher of his family, and author of the "Natural System of Botany." He went to Paris in 1765 to complete his studies under the direction of his uncle. In 1770 he took the degree of doctor of medicine, and was soon afterward chosen Professor of Botany in the Royal Garden. In 1789 he published his great work, the "Genera of Plants," in which, for the first time, the whole vegetable kingdom was arranged according to a natural classification. He subsequently filled many important scientific posts in Paris, and continued till his 88th year to dictate valuable memoirs on the science of botany. The great work of Jussieu, in an improved and amended form, is one of the chief text-books on botany, not only in France but in England. He died in Paris, France, Sept. 17, 1836.

Jussieu, Bernard de, a French botanist; brother of A. de Jussieu; born in Lyons, France, Aug. 17, 1699. He became professor and demonstrator in the Royal Garden, and was chosen a member of the French Academy of Sciences, and of several foreign societies. He published an edition of Tournefort's "History of Plants in the Environs of Paris," and was the author of a book entitled "The Friend of Humanity; or, the Advice of a Good Citizen to the Nation." He died in Paris, France, Nov. 6, 1776.

Jussieu, Joseph de, a French botanist; brother of A. and of B. de Jussieu; born in 1704. He was a member of the Academy of Sciences at Paris, and accompanied Condamine to Peru in 1735. He was not only a good naturalist and physician, but an excellent engineer. He published a journal of his voyages. Died April 11, 1779.

Just, St., Louis Antoine de (s*ang* zhüst), a French author and revolutionist; born near Nevers, France, Aug. 25, 1767. When the revolution broke out he became one of its most fiery advocates. Able, accomplished, and rigidly correct in his habits, he speedily rose to eminence. In 1791, he brought out his "Spirit of the Revolution and Constitution of France," and in the following year was chosen representative of the department of Aisne in the Convention. While in Paris he was among those who sternly advocated and voted for the death of Louis XVI. St. Just played a conspicuous part in all the acrimonious debates which took place at this period between his own party and the Girondins. After the fall of the latter party, in June, 1793, he became associated with Robespierre in the sanguinary republican government which followed; and St. Just's name is identified with the hideous and indiscriminate bloodshed which marked the decrees of the Convention in the latter part of 1793, and beginning of 1794. On Feb. 19 in the latter year he was chosen president of the Convention, and in this capacity drafted the report which sent his political opponents, Danton, Hebert, and others, to the scaffold. After the dawn of a reaction in popular feeling, and the final absorption of power by the moderate Republican party, St. Just was seized, with his colleague ROBESPIERRE (*q. v.*), and guillotined, July 27, 1794.

Juste, Théodore (zhüst), a Belgian historian; born in Brussels, Jan. 11, 1818. He became in 1859 keeper of the Museum of Antiquities there, and in 1870 Professor of History. He is best known by his "Founders of the Belgian Monarchy" (27 vols. 1865–1881). Many of his earlier works (1830–1880) are abridged in "The National Pantheon" (1881). He died Aug. 11, 1888.

Juste milieu (mē-lyuh′), in French politics after the revolution of 1830, a term that acquired a political signification, and came into very frequent use, because of the declaration of the organs of Louis Philippe, that the *juste milieu* was the only principle of government which could secure the welfare of France.

Justice, Department of, an executive branch of the United States government. At its head is the attorney-general, whose office goes back, historically, to the foundation of the government, though the Department of Justice dates only from 1870. The attorney-general is appointed by the President and must be confirmed by the Senate. He is a member of the cabinet and his salary is $12,000 a year. The establishment of this department brought under his control all United States district attorneys and marshals, and secured uniformity in the trial and prosecution of cases. The attorney-general rarely argues cases, this work being done by his subordinates. The solicitor-general takes the place of the attorney-general in the latter's absence. He has charge of the conduct of cases in the courts at Washington.

Justice, High Court of, one of the two great sections of the English supreme courts, as arranged by the Judicature Acts which have been passed at various times by Parliament.

Justice, Lord Chief, the title given to the chief judge of the Queen's (or King's) Bench Division of the High Court of Justice; formerly given also to the chief judge of the Common Pleas. He of the Queen's (or King's) Bench was, and still is, Lord Chief-justice of England; and on him were conferred, in 1881, the powers of the Lord

Chief-justice of Common Pleas, that division of the court being abolished. Puisne (*i. e.*, lesser or ordinary) judges in all divisions of the high court bear the title of justice.

Justice of the Peace, a public officer invested with judicial powers for the purpose of preventing breaches of the peace, and bringing to punishment those who have violated the law. These officers, under the Constitution of the United States, and some of the States, are appointed by the executive; in others they are elected by the people and commissioned by the executive. In some States they hold their office during good behavior; in others, for a limited period. At common law, justices of the peace have a double power in relation to the arrest of wrong-doers; when a felony or breach of the peace has been committed in their presence, they may personally arrest the offender or command others to do so, and, in order to prevent the riotous consequences of a tumultuous assembly, they may command others to arrest affrayers when the affray has been committed in their presence. If a magistrate be not present when a crime is committed, before he can take a step to arrest the offender, an oath or affirmation must be made, by some person cognizant of the fact, that the offense has been committed, and that the person charged is the offender, or there is probable cause to believe that he has committed the offense. The Constitution of the United States directs that "no warrants shall issue but upon probable cause supported by oath or affirmation" (Amend. IV.). After his arrest the person charged is brought before the justice of the peace, and after a hearing he is discharged, held to bail to answer to the complaint, or, for want of bail, committed to prison. In some, perhaps all, of the United States, justices of the peace have jurisdiction in civil cases given to them by local regulations. In Pennsylvania their jurisdiction in cases of contracts, express or implied, extends to $100.

Justices, Lords, in Great Britain, persons formerly appointed by the sovereign to act for a time as his substitute in the supreme government, either of the whole kingdom or of a part of it. The lord-lieutenant of Ireland is a familiar example of a lord-justice. The title lords-justices of appeal is in England given to a certain number of judges belonging to the appeal division of the Supreme Court of Judicature.

Justices in Eyre, or **Itinerant Justices,** in England, justices who travel about over fixed circuits dispensing justice, the judges of assize in fact. Such itinerant judges were first appointed in 1176; in Magna Charta they were required to visit each county annually.

Justiciary Court, the highest criminal court in Scotland. Its judges are seven of the judges of the Court of Session — viz., the lords president and justice-clerk, and five others appointed by patent. It sits usually in Edinburgh, but also holds circuit courts twice a year in a number of towns, four times at Perth, Dundee, and Aberdeen, and six times in Glasgow, the kingdom being divided for that purpose into three divisions or circuits. The jurisdiction embraces all crimes whatever; and it is an appellate court as regards inferior criminal tribunals. Its decisions are final, there being no appeal to the House of Lords.

Justifiable Homicide, in law, homicide in circumstances which render it a justifiable act. When, for instance, an executioner hangs a criminal legally condemned, or when no other way of preventing an atrocious crime, say murder, is available, the deed ceases to be murder and becomes justifiable homicide.

Justification, in bookbinding, attention to keeping the matter of pages in exact register or correspondence, to secure even margins. In law, the bringing forward in court of a sufficient reason why a defendant did what he is called on to answer; such a plea must set forward some special matter. In printing, the adjustment of distance between the letters in the words and the words in a line, so as to avoid any glaring disproportion and make them fill the measure. In theology, Protestant: a forensic act by which God declares the sinner righteous, and acquits him of all guilt on account of the meritorious life and atoning death of Jesus Christ the Redeemer, imputed to the sinner and received by faith alone. The Scripture passages adduced in support of this view are Isa. liii: 11; Acts xiii: 39; Rom. iii: 20–31, iv: 1–25, v: 16–21; viii: 30; Gal. ii: 16–21, iii: 8, 11; Tit. iii: 7, etc. A broad distinction is drawn between justification and sanctification. (See the Eleventh Article, and the Homily, Of Justification, also Confession of Faith, ch. xi.) Roman Catholic: the infusion of righteousness into the sinner by the Spirit of God. On that view there is not essential distinction between justification and sanctification. In support of this view, and against the distinction drawn by Protestants between justification and sanctification, Roman theologians cite I Cor. vi: 11. St. Paul has been telling the Corinthians that the "unrighteous shall not inherit the kingdom of God." He continues, "And such were some of you; but ye are washed, but ye are sanctified, but ye are justified." Here sanctification is put before justification. See also Eph. iv: 24.

Justin I. (Flavius Anicius Justinus), a Byzantine emperor; born in A. D. 450. He

rose to the rank of general from being a private soldier, before which he was a swineherd. The soldiers of the Prætorian band forced him to accept the imperial dignity on the death of Anastasius in 518. He recalled the bishops who had been banished by the Arians, and published several severe edicts against that sect. Hearing of the destruction of Antioch by an earthquake, he laid aside the imperial robes, clothed himself in sackcloth, and passed several days in fasting and prayer, to avoid divine judgment. He rebuilt that city, and other places which were destroyed by the same calamity. He died Aug. 1, 527.

Justin II., a Byzantine emperor; nephew and successor (565) of Justinian I. He caused his cousin Justinus to be strangled, and put to death some of his senators from a suspicion of their being disaffected. He made war against Chosroes, King of Persia, who, being defeated at the head of a numerous army, was obliged to sue for peace. Justin II. married Sophia, niece of Theodore, wife of the Emperor Justinianus, a woman of high spirit, who, taking advantage of her husband's weakness, governed the empire in conjunction with Tiberius. He died Oct. 5, 578.

Justin, a Latin historian of the 2d century, who made an abridgment of the "Universal History" written by Trogus Pompeius. This work remains, but the original is lost.

Justin, St., or Justin Martyr, a Christian apologist of the 2d century; born in Sichem, Samaria. Carefully trained in the schools of Greek philosophy, he was converted to the Christian faith when about 30 years of age. A persecution breaking out against the Christians, under Antoninus, Justin presented to that emperor an admirable apology in their behalf, which had the desired effect. He afterward addressed another apology to Marcus Aurelius, in which he defended the Christians against the calumnies of Crescens, a Cynic philosopher. For this, and his neglect of pagan worship, he was condemned to be scourged and then beheaded, which sentence was put in execution A. D. 165.

Justinian (-tin'i-an) **I. (Flavius Anicius Justinianus),** a Byzantine emperor; born in Tauresium, Dardania, Illyricum, probably May 11, 483. He succeeded his uncle Justin I. in 527. He had married Theodora, a well-known actress and courtesan, who was created Augusta, and crowned the same day as her husband. About the same time, BELISARIUS (*q. v.*), was married to Antonina, a professional companion of Theodora; and to the intrigues and jealousies stirred up by these two women is to be attributed the principal part of the un-

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toward circumstances which have cast a stain on the personal character of Justinian I. The political events of his reign may be summed up in the wars of Belisarius and the eunuch Narses, who obtained splendid successes over the Persians in the East, and the Vandals and Goths in Italy, and in the terrible sedition which broke out in Constantinople in 532, and was extinguished in the blood of 30,000 persons. In the latter case, Justinian I. would have fled from his capital, and in all probability have lost his crown, but for the courage and talents of Theodora, whose vices were gilded by some of the rare qualities befitting an empress. The glory of his reign is the famous JUSTINIAN CODE (*q. v.*). Justinian I. was

also a great builder and engineer, and works of public utility were kept constantly in progress in all parts of the empire. He was remarkable for temperance and chastity, and not less so for his great learning and diligent application to business; but his religious bigotry, and his weakness in the hands of Theodora, marred all his good qualities. He died Nov. 14, 565.

Justinian II., surnamed RHINOTMETUS, a Byzantine emperor. He succeeded his father, Constantine IV. in 685. He was deposed and banished for his cruelty, by his general, Leontius, 695; regained his throne 10 years afterward, and, exhibiting the same ferocious disposition, was assassinated, 711.

Justinian Code, a famous digest of the Roman law, compiled from the Gregorian, Theodorian, and Hermogenian codes, at the command of the Emperor Justinian I., by 10 of the ablest lawyers of his reign, under the guidance of the jurisconsult Tribonian. Their labors consisted (1) of the "Statute Law," or Justinian Code, properly so called; (2) the "Pandects," a digest of the decisions and opinions of former magistrates and lawyers — these two compilations consisted of matter that lay scattered through more than 2,000 volumes, now reduced to 50; (3) the "Institutes," an abridgment in four books, containing the substance of all the laws in an elementary form; (4) the laws of modern date, including Justinian's own edicts, collected into one volume, and called the "New Code." These labors, which a Cæsar had not been able to accomplish, were completed by the year 541; and we can only lament that Christianity was not in its prime at that epoch, whereby the spirit of natural right and equity had been infused into them in place of the dogmas of authority.

Jute, a textile fabric obtained from *Corchorus capsularis*, a plant belonging to the natural order *Tiliaceæ* (lime or linden). The jute plant is a native of the warmer parts of India, where its cultivation is carried on, especially in Bengal, on an extensive scale. It is an annual plant, growing to a height of 12 or 14 feet. The fiber forms the inner bark of the plant, and possesses in an eminent degree the tenacity common to the bark of the plants of this order. The fiber is fine and has a shining surface; it is injured by exposure to water, and hence is not well adapted for cordage and canvas, but is in extensive use for making bags, and in the United States and Great Britain serves many useful purposes, being mixed with hemp for cordage, and with silk in the manufacture of cheap satins; its principal use is in the manufacture of coarse cloth for bagging, and in making the foundation of inferior carpets, mats, etc. In Bengal, jute has been cultivated and its fibers woven into various fabrics from a remote period, but it is only since about 1830 that its manufacture has risen to importance in Europe. The headquarters of this branch of industry are at Dundee. The rice, cotton, sugar, coffee, pepper, and other articles of East Indian commerce are almost wholly carried in gunny bags (as the jute bags are called), large quantities of which are made in and exported from Bengal itself.

Jüterbog (yü'ter-boG), or **Jüterbogk** (-bok), a town in the Prussian province of Brandenburg, 39 miles by rail S. S. W. of Berlin. Cloth, cigars, and wine are manufactured. Near Jüterbog is Dennewitz, where the Prussians under Bülow defeated the French under Ney and Oudinot, Sept. 6, 1813.

Jutiapa (HÖ-tē-ä'pä), a department of Guatemala, bounded on the N. by Jalapa and Chiquimula, on the S. by the Pacific Ocean; on the S. E. by Salvador, on the W. by Santa Rosa; area 1,563 square miles; pop. 52,856; principal industries cattle-raising and coffee and sugar planting. Capital, Jutiapa.

Jutland, a division of Denmark, formerly comprising the whole continental portion of the Danish dominion, but now restricted to the part of the peninsula belonging to Denmark to the N. of Schleswig, extending from about lat. 55½° to nearly 58° N., being about 170 miles in length, and from 60 to 80 in breadth; area, 9,904 square miles; pop. (1906) 1,124,694. It is of an oblong form, with the addition of a triangle toward the N. Surface generally flat, and much broken by indentations of the sea. Soil various. Products rye, oats, buckwheat, and dairy produce. Cattle, horses, and hogs are extensively reared and exported. Manufactures unimportant. Capital, Aarhuus. Jutland is supposed to have been originally the country of the CIMBRI (*q. v.*). Later, its inhabitants, known as Jutes, shared in the Saxon invasion of England, and subsequently formed part of the Saxon alliance against Charlemagne, and, under the denomination of Norman (Northern), frequently ravaged the N. W. coasts of Germany and France, ultimately establishing a colony in the last named country.

Juturna (-turn'-), the daughter of Daunus, changed by Jupiter into a fountain, whose waters had the power of restoring virginity.

Juvenal (jö've-nal) **(Decius Junius Juvenalis),** a Roman poet and satirist; born probably in Aquinum, Campania, about the beginning of the reign of Claudius. He studied rhetoric under the most celebrated masters, and is said to have become an eminent pleader. His first essay as a poetical satirist was directed against the player Paris, and for repeated attacks of the same kind he is said to have been sent into an

honorable kind of exile by being made commander of a cohort at Pentapolis, on the borders of Egypt, in his 80th year. Juvenal may be said to have been the last of the Roman poets, and as the bold and unflinching castigator of vice he stands without a rival. Sixteen of his satires are extant. English translations have been made by Dryden, Gifford, etc.

Juvenile Offenders. In the eye of the law persons are considered capable of committing crime in Great Britain at the age of seven, and are punishable like other persons. But in England and Ireland, whenever a person under the age of 16 is convicted and sentenced to be imprisoned, the court or magistrates may also sentence him to be sent to a reformatory school for not less than two or more than five years. Such sentence, however, cannot be passed on an offender under 10 years of age, unless his offense is by law punishable with penal servitude or imprisonment, or unless the sentence come from a superior court, such as a court of assize or of quarter sessions. Children who have not yet committed crime, but are in a vagrant and neglected state, may also be sent to an industrial school.

In the United States the law with regard to juvenile offenders varies in the different States. In 1898–1899 the number of reform schools reported was 82; instructors employed, 578; pupils attending school, 22,692, and 14,673 in industrial departments. The total number of inmates was 24,925. The value of grounds and buildings was $18,873,587. The expenditures on buildings and grounds amounted to $605,010; for salaries and other expenses, $2,800,281, making a total expenditure of $3,405,291. The number of assistants, not including instructors in school departments, was 1,788. There were 16,699 white inmates and 2,784 colored inmates; 8,514 were of native parents and 4,122 of foreign-born parents. Those that could only read when admitted were 2,207, and 1,595 could neither read nor write. The number committed to the institutions during the year was 11,676 and the number discharged 11,990. When discharged from the schools many of the pupils possessed a trade and were provided with good homes; all could read and write; the majority had received the equivalent of a common school education.

Juventas (-ven′-), a Roman goddess, who presided over youth and vigor. She is the same as the Hebe of the Greeks, and was represented as a beautiful nymph in variegated garments.

Jyar (jī′-), the 8th month of the Jewish year, corresponding, at the earliest, with our April; but it may be as late as May; it has only 29 days.

Jynx (jinks), in Greek mythology, the name of the bird (*jynx torquilla*, the wryneck) by which Jason won the love of Medea. The bird was given to him by Aphrodite, and is said to have been the daughter, some say of Peitho or of Echo and Pan, some say of Pierus, transformed into a bird.

K

K, the 11th letter of the English alphabet, representing a guttural articulation, produced by pressing the root of the tongue against the upper part of the mouth behind, with a depression of the lower jaw and opening of the teeth, and differs, in most ancient and modern languages from g hard only by a stronger pressure of the tongue, and a stronger expiration. (See G.) K, by the Greeks called kappa, is probably of later origin than G, as its most ancient form on monuments seems to be a contraction of gamma, that is, in its first straight and its second bent form (I C). In Latin k was little used, its place being supplied by **c**. The Greek K was not adopted by the Latins before the time of Sallust, and was only used in words which began with ca, as *kaput, kalumnia, kalumniator;* hence a K was branded on the forehead of calumniators. As an abbreviation, in Latin, it signifies *Kæso* (a name), and several other words *kalendæ*, etc. The Greek K stands on coins for *Kaisar*, Cæsar; *Klaudios*, Claudius; *Kampania*, Campania, etc. It often also signifies Carthage. As an abbreviation it often stands for *kai* and *koinon*, common; *kolonia*, colony, etc. The Greek K′ signifies 20, and ,K = 20,000. K, in Latin, is equal to 250; with a horizontal dash over it, K = 250,000. It answers to *kaph* or *koph* in Hebrew. The Italians, Spaniards, and Portuguese have banished the letter entirely from their alphabet. The French use it only in words originally German, Breton, foreign proper names, etc. At the beginning of a word or syllable **k** is not pronounced when followed by n, as knife, knee, know. K, before a vowel, is one of the easiest sounds children learn; but it is difficult if it precedes another consonant.

Kaaba. See CAABA.

Kaalund, Hans Vilhelm (kä′lönd), a Danish poet; born in Copenhagen in 1818. After making futile attempts at sculpture and painting, a fortunate poem in honor of Thorwaldsen (1838) turned him to literature. Though he had published before "Et Foraar" (A Springtide), a collection of his best poems old and new, which, while not of great scope, were graceful and musical, brought him his first success. "Fulvia" (1875), a fine drama depicting the struggles of the early Christians, contained many lyrics — a fault in a play intended for the stage; though altered it was successfully acted in 1880. "En Eftervaar" (Return of Spring, 1877) deserves mention. He excelled in satirical fables, his being the best Denmark has produced. He died in 1885.

Kabaro (-bä′rō), a small drum used by the Egyptians and Abyssinians.

Kabul (kä-böl′), capital of the kingdom of Afghanistan; 165 miles from the Indian station and fort of Peshawur, 600 from Herat, and 290 from Kandahar; on the Kabul river, at an elevation of 6,400 feet above sea-level. The citadel, Bala-Hissar, contains the palace and other public buildings, the fort, etc. Kabul carries on a considerable trade with Hindustan through the Khyber Pass. It was taken by the British in 1839 and in 1842, and on the occasion of a subsequent war with the British in 1879 Kabul was twice taken by their troops. Pop. 75,000.

Kabul River, a stream rising in Afghanistan at the height of about 8,400 feet, flowing E., passing through the Khyber Pass into India, and falling into the Indus at Attock. Length, 300 miles.

Kacic-Miosic, Andrija (kä′chich-mē-ō-shich′), a Croatian poet; born in Brist, Dalmatia, in 1690. He performed for his country a service similar to that of Percy in his "Reliques" to England, or of Allan Ramsay in his "Evergreen" or "Tea-Table Miscellany" to Scotland, in publishing "Recreations of the Slavonic People" (1756). This was an anthology of popular songs which he collected or adapted, celebrating the exploits of South-Slavic heroes from the earliest times. Many editions have appeared, and it is popular today with the Southern Slavs. He died in Zaostrog, in 1760.

Kadesh, Kadesh-Barnea, or **En-mishpat,** the name of a fountain, city, and the desert around (Psa. xxix: 8), in the S.

border of the Promised Land. It is said, in Num. xx: 65, to lie in the "uttermost border of Edom," and was probably situated beyond the great valley El-Arabah, S. of the Dead Sea. Kadesh was twice visited by the Israelites in their wanderings—once soon after they left Mount Sinai, and again 38 years after. At the first visit the mission and return of the 12 spies took place, the rebellion of the people, and their presumptuous effort to enter Canaan by the pass Zephath, immediately N. of Kadesh (Num. xiii.; xiv). At their second visit occurred the death of Miriam, the murmuring of the people for water, the miraculous supply, the sin of Aaron and Moses in smiting the rock, and the fruitless request for a passage through Edom (Num. xx: 1-22).

Kadi. See CADI.

Kadiak (käd-yak'), an island off the S. coast of Alaska, separated from the mainland by Alaska Strait; area, 3,465 square miles; pop. about 1,500; Eskimos engaged in salmon-fishing. It is mountainous and heavily wooded, with good harbors.

Kadijah (kä-dē'jä), the first wife of Mohammed, who, at the period of her marriage with the prophet, was the widow of two husbands and 40 years of age, Mahomet being only 25. She had four sons and four daughters by Mahomet, among the last the beautiful Fatima. She died in 628.

Kadmonites, a tribe of Canaanites, who inhabited the Promised Land, E. of the Jordan, about Mount Hermon.

Kadsura, the Japanese name of a genus of *Schizandraceæ*. They are mucilaginous shrubs, with three sepals, six to nine petals, and 15 or more stamens, found in tropical Asia. By boiling the juice a mucilage is obtained which is used in making Broussonetia paper. Japanese women use it also to clean pomatum from their hair.

Kaempfen, Albert (kemp'fen), a French novelist and journalist; born in Versailles, France, April 15, 1826. He wrote under the pseudonyms "Feyrnet," "Henrys," "Henri Este." His romance, "The Cup of Tea" (1866), and the humorous work, "Paris, the Capital of the World" (1877), deserve mention.

Kaf, the mountain which in Mohammedan legend surrounds the world.

Kaffa, or **Feodosia,** a seaport in the Russian province of Taurida; on a bay on the E. side of the Crimea; 62 miles E. by N. of Simferopol; is defended by walls and a citadel; and contains the ruined palace of the Khans of the Crimea and a Greek cathedral. Near by is an Armenian monastery (1442). Soap and caviare, camel-hair carpets, and sheepskin rugs are manufactured; and here is the only oyster fishery in Russia. The harbor is safe and spacious, but there is comparatively little shipping. The ancient Theodosia or Feodosia was a flourishing colony of the Milesians; in the 13th century the Genoese founded here a successful trade depot, which they called Kaffa. It fell to the Turks in 1475, and to the Russians in 1792.

Kaffirs, a native race of Southern Africa, belonging to the great Bantu family, of negroid character, but distinguished from the Negroes by a larger facial angle (the head being formed like that of Europeans), a high nose, hair frizzled, but less woolly than that of the Negroes, and a brown or iron-gray complexion, differing from the shining black of that race. The origin of the name is given in the succeeding article. It is now retained by geographical writers to denote the savage tribes, whose physical characteristics have been described, extending on the E. side of Africa from the Cape Colony to Delagoa bay or further N. They are divided into branches which take their name from the founder of the branch, generally with Ama, signifying people, as a prefix. In 1780, at the time when the Great Fish river was made the boundary between the Cape Colony (then Dutch) and the Kaffirs, there were four great branches occupying this region—the Amapondomisi, the Amaponda or Pondos, the Amatemba or Tambookis, and the Amakosa or Amaxosa. The last-mentioned branch was subdivided into two smaller ones, the Amagaleka, inhabiting the region N. E. of the Great Kei river, and the Amararabe, the region S. W. of that river. The Amafengu or Fingoes are a tribe of more recent formation, consisting of the remnants of once powerful tribes that were dispersed and driven S. by Tshaka, a powerful King of the Zulus or Amazulu, another Kaffir tribe dwelling N. of Natal. The former tribes have been incorporated with Cape Colony, and Zululand has been latterly annexed to Natal. The Zulus, or Amazulu, originally a small tribe setted on the N. of the Tugela river, first acquired political importance in the course of the 19th century, and extended their sway as far N. as the Delagoa bay, and also far into the interior. A large number of them now dwell within the boundaries of Natal, where they are becoming civilized. The Swazi or Amaswazi dwell between the Transvaal and Delagoa bay. The Matebele, now living N. of the Limpopo, who have been rather prominent in recent years, are also a branch of the Kaffirs. They at one time lived much further S., but were driven N. by the Boers. The Kaffirs are a tall, handsome, vigorous race, of simple habits, their principal food being milk in the form of curd. Their dress used to be entirely made of skins, but latterly they have begun to substitute various European arti-

cles, such as blankets. Ivory rings, beads, feathers, etc., are their chief ornaments. Their dwellings are low, circular cabins, grouped in *kraals*, or villages, and are constructed by the women. Plurality of wives is general. Cattle are of the first importance and the chief object of affection to a Kaffir. They obey and follow their master like dogs. The ground is cultivated by the women. At the age of 12 the boys are appointed to the care of cattle, and exercised publicly in the use of the javelin and the club. The girls, under the inspection of the chiefs' wives, are taught to perform the work of the hut and the garden. The Kaffirs display great skill in the use of arms. Their weapons are the assagai or spear, the shield, and the club. They are very fond of the chase. Each horde or tribe has a hereditary and absolute chief. Their religion is a sort of ancestor-worship, and among them the practice of witchcraft is prevalent. Various Christian missions have met with considerable success among them. The continued encroachments of the British, and other accompanying circumstances tending to arouse the suspicions and exasperate the feelings of the natives, have repeatedly led them to engage in open hostilities, and they have proved formidable opponents to the Dutch and British. What are known as the first, second, and third Kaffir wars took place respectively in 1811, 1819, and 1835, the Kaffirs on each occasion swarming in great numbers across the Fish river into Cape Colony. From 1846 to 1853, there were almost constant hostilities. Peace was, however, maintained with all the tribes from 1853 to 1879, when a war with the Zulus N. of Natal broke out, in which the British, though ultimately successful, sustained a severe disaster. See BOERS: CAPE COLONY: NATAL: ZULULAND.

Kaffraria, a name adopted by the Portuguese from the Arabs, who call all the African continent, S. from Sofala, the land of kafirs (infidels). It was first applied to the whole width of the continent, from Cape Corrientes on the E. to Cape Negro on the W. As the names of particular states and peoples became known, the extent of Kaffraria diminished; the term, latterly applied only to the territory between the N. E. borders of Cape Colony and Natal, is now going out of use, its substitute being the Transkeian Territories which form part of Cape Colony. The district for some time called British Kaffraria was formerly part of the territory of the Amaxosa and Amatembra Kaffirs, by whom it was ceded to Sir B. Durban in 1835. It was restored to the Kaffirs in the following year, but again taken possession of by the British in 1847. In 1860 it was erected into a separate colony, and in 1865 was incorporated with Cape Colony, and the name has fallen out of use. The chief town here is King William's Town.

Kafiristan, Kaffiristan, or **Caffristan,** a country of Central Asia, on the S. declivity of the Hindu Kush Mountains, forming part of the N. basin of Kabul; area, about 215,400 square miles; pop. (1904) est. about 200,000. It forms a part of Afghanistan, though the tribes are generally independent. The inhabitants differ from the neighboring tribes in their origin, language, creed, and complexion. In the latter, they bear a resemblance to Europeans, and are apparently of Aryan origin. Their state of isolation and independence is mainly owing to the natural strength of the region, which, though frequently invaded, has never been subdued. The soil is sufficiently fertile to render outside intercourse almost unnecessary. The inhabitants are very skillful workers in wood and metals.

Kagoshima (kä-gō-shē′mä), a town of Japan, on a large bay of the same name, at the S. end of Kiu-siu Island, with manufactures of pottery and porcelain, arms, and cotton; pop. (1893) 56,139. It was bombarded by the British fleet in 1863.

Kahau. See PROBOSCIS MONKEY.

Kai-fung, capital of the Chinese province of Honan, near the S. bank of the Hoangho, where the great inundation occurred in 1887, long the chief settlement of the Jews in China. Among its 100,000 inhabitants are many Mohammedans.

Kail, or **Kale,** the name given in England and Scotland to a variety of the *Brassica oleracea*, differing from the cabbage in the open heads of its leaves, which are used as "greens" and as food for cattle. There are many varieties, the leaves being sometimes green, sometimes reddish-brown, sometimes purplish in color, and plain, waved, curled, or laciniated in form. Usually a biennial plant; it is sometimes perennial, as in the variety known as Milan kale (*chou de Milan*). It is variously known as borecole, winter greens, German greens, and Scotch kale.

Kailas (kī-läs′), a sacred mountain of the Hindus in the Himalayas, near the sources of the Indus and Sutlej; height, 20,226 feet.

Kaimacon, or **Caimacon** (kī′ma-kon), a title given in the Ottoman empire to a deputy, or governor. There are generally two kaimacons — one residing at Constantinople, the other attending the grand vizier as his lieutenant.

Kaims. See ESCAR.

Kaingning. See NANKING.

Kainite, a hydrous sulphate of potash and magnesia, found along with beds of rock-salt, especially in Germany and Aus-

tria. It is valuable for the production of double sulphate of potash and magnesia, and is used as a manure.

Kaiouk (kī-ök′), or **Gaiou-Khan** (gī′ö-khän), 3d grand khan of the Mongols; born about A. D. 1205. He was son of Oktai, and grandson of Jenghis Khan. He completed the conquest of China, commenced by his father, but died suddenly in the midst of his victories. Kaiouk is called among the sovereigns of China Ting-Tsoung. He died in 1248.

Kai-ping, the coal region in Chih-li, China; 75 miles N. E. of Tient-sin, near the Lan-ho river, with railway connection with Hokow and with Tient-sin *via* Taku.

Kairwan (kīr-wän′), a walled town of Tunis, in an open, marshy plain, 80 miles S. of the capital. It contains about 50 ecclesiastical structures, of which the mosque of Okba, who founded Kairwan about 670, is one of the most sacred of Islam. Outside the city, to the N. W., is the mosque of the Companion — *i. e.*, of the Prophet; this and other sacred tombs have rendered Kairwan — *i. e.*, caravan or resting-place — the Mecca or sacred city of Northern Africa. As such it has been jealously guarded from defilement by the presence of Jews and for the most part of Christian travelers; but it was entered and explored by the French in 1881. Kairwan makes copper vessels, potash, carpets, and articles in leather. Pop. 10,000 to 15,000.

Kaisariah (kī-zär-ē′ä) (ancient Mazaca), a town of Asiatic Turkey, province Karamania, on the Karasa, a tributary of the Euphrates, 135 miles S. E. of Angora. It is a considerable place and the emporium of an extensive trade. Cotton is grown in great quantities in the vicinity. Manufactures, cotton fabrics and morocco leather. Pop. about 25,000.

Kaisar-i-Hind (kī″zär-ē-hind′), Hindustani for Empress of India, the title conferred on Queen Victoria in 1876 by act of Parliament, and proclamation at Delhi.

Kaiser (kī′zer), an emperor; the Emperor of Germany. He is called Kaiser because by Diocletian's arrangement certain provinces near the Danube, which came into possession of the German empire in 1438, were anciently assigned to a Cæsar. This ancient title of the German emperors was revived when, in 1871, King William III. of Prussia at the successful conclusion of the Franco-Prussian War was proclaimed Emperor of Germany.

Kaiser, Friedrich, a German humorous writer; born in Biberach, April 3, 1814. He is best known by his comedies, which were successfully performed, and of which "Hans Hasenkopf" (1834) is a good example. He died in Vienna, Nov. 7, 1874.

Kaiserslautern (kī′zers-lou-tern), or **Lautern,** a town of the Bavarian Palatinate; 52 miles S. W. of Worms. It has of late years developed into an important manufacturing place, the chief manufactures being tissues, yarn, sewing and other machines, ultramarine, furniture, beer, bricks, etc., and there are ironworks, steam sawmills, and railway shops. Frederick I. built a castle here in 1152 (destroyed by the French in 1713); and near by the French republican armies were defeated in 1793 and 1794. Pop. (1905) 52,306.

Kaiserswerth (kī′zers-vert), a Prussian town on the Rhine, 10 miles below Düsseldorf, the seat of the deaconesses' house founded by Pastor Fliedner; pop. about 2,500.

Kaiser Wilhelm Canal. See BALTIC AND NORTH SEA CANAL.

Kaiser Wilhelm's Land, the N. section of Southeastern New Guinea; declared a German protectorate in 1884; area, estimated 70,000 square miles; pop. about 110,000. The administration was transferred from the New Guinea Company to the imperial government, April 1, 1899. Gold has recently been found in the Bismarck Mountains.

Kaithal (kī-thul′), an ancient town in the Punjab, India, 93 miles N. N. W. from Delhi. It is connected traditionally with the monkey-god Hanuman, and is called in Sanskrit Kapisthala, the "abode of monkeys." It has saltpeter refineries, and manufactures lac ornaments and toys. It became British in 1843.

Kajaani, Johan Fredrik (ka-yä′nē), a Finnish writer; born in Sotkamo, 1815. He was the author of the first history of Finland written in Finnish. He died in 1887.

Kajak, the boat of the Eskimos, used by the men only. About 18 feet in length, it is 18 inches broad in the middle, and, tapering at both ends, is about a foot deep. Without outriggers, it is covered with skins and closed at the top, with the exception of a hole in the middle, filled by the boatman, who, sitting on the floor of the boat, propels it with a paddle. The waves are kept from breaking over the rower's body into the interior by an arrangement of waterproof skins, or by fastening the skirt of his dress down over the edges of the hole. The Russians of Alaska call the kajak "baidarka." It is a remarkably buoyant, and though difficult to manage can be driven through the water at great speed.

Kakabikka, a remarkable cataract of British North America, in the Kamanatekwoya river, just before it enters Lake Superior. It has a fall of 130 feet over a mica slate rock.

Kakapao, or **Kakapo,** a bird of the parrot family (*Psittacidæ*), though it is in many respects of a unique type. It is indigenous to New Zealand, and called by the English there the ground parrot, or owl parrot. It became first known to foreign ornithologists in 1843, and is now represented in most European museums. Its habits are wholly nocturnal, hiding in rocks and under the roots of trees by day, seeking food only by night. In size it resembles a raven; its feathers are a green or brownish-green color, striped longitudinally with yellow; it has a very powerful beak, with hairs and elongated feathers about its face, as in the case of the owl. Its wings are too short to enable it to fly, and it chiefly walks along the ground or climbs trees, thus making it a prey to cats, rats, and other animals. It is fast becoming extinct.

Kakemonos (-kē′-) Japanese name for paintings on paper or silk, having a rod at bottom like a map, and hung similarly on a wall.

Kakodyl, or **Cacodyl,** in chemistry, an organo-metallic base, containing arsenic. It is prepared from its chloride by the action of zinc. It is a thin, transparent, colorless liquid, resembling arsenietted hydrogen in smell. It is very inflammable, and when poured into oxygen, chlorine, or the air, it inflames. It boils at 338° F., and crystallizes in large transparent square prisms when cooled down to 21° F. It forms salts with the halogens and acids. It also forms an acid containing three equivalents of oxygen. This acid is peculiar as possessing no poisonous property, though containing nearly half its weight of arsenic. Formula $(CH_3)_4As_2$, or Kd.

Kakodyl, Oxide of. When a mixture of equal weights of arsenious acid and dry acetate of potash is submitted to distillation, a heavy poisonous liquid is obtained, which has a most disgusting odor of garlic, and takes fire spontaneously when exposed to the air. This liquid, the oxide of kakodyl, has long been known under the names of alcarsin (arsenical alcohol), and Cadet's fuming liquor. Formula $(CH_3)_4As_2O$.

Kakongo. See CACONGO.

Kala (kä′lä), in Hindu mythology, Siva in one of his manifestations; sometimes used for Time. (See KALEE.) Also one of the names of Yama, regent of the dead; hence, sometimes death itself.

Kalafat, a town in Rumania, on the left bank of the Danube, about 1 mile E. of Widdin, on the opposite bank. During the Russo-Turkish War of 1853–1854 it was twice unsuccessfully attacked by the Russians. Since Rumania became an independent kingdom it has made rapid progress.

Kalahari, or **Kalihari,** a desert region in Central South Africa, N. of the Orange river; a large tract of which is included in the British protectorate of Bechuanaland. It is very flat, subject to long-continued droughts, and has only dried-up river beds; nevertheless it is not devoid of vegetation, patches of grass and shrubs occurring here and there. An abundant supply of watermelons and some remarkable varieties of tubers, together with large herds of antelopes and other game, provide ample subsistence to the bushmen and Bakalahari inhabiting this barren region.

Kalakaua (kal-a-kou′ä) **I., David,** King of Hawaii; born Nov. 16, 1836. He was elected, Feb. 12, 1874, to succeed Lunalilo, and reigned till his death. In 1887 he was compelled to grant a new constitution which restricted to a considerable extent the royal authority. He died in San Francisco, Cal., Jan. 30, 1891.

Kalamata (kä-lä-mä′tä), a seaport in the Peloponnesus of Greece, on the Gulf of Koron; the seat of an archbishop. Its exports (currants, figs, olive-oil, and soap) have an annual value of about $1,500,000; its imports, of $2,500,000.

Kalamazoo, a city and county-seat of Kalamazoo co., Mich., on the Kalamazoo river and the Michigan Central, the Lake Shore and Michigan Southern, and several other railroads; 47 miles S. of Grand Rapids. It is the trade and jobbing center for a large agricultural region, is the most important celery market in the world, has over 250 mercantile houses, and has manufactories representing about 70 distinct industries. The city is the seat of Kalamazoo College (Bapt.), Michigan Female Seminary, and Nazarette Academy (R. C.), the State Insane Asylum, Borgess and Queen City Hospitals, Children's Home, Home for Erring Girls, Home for Feeble-Minded Children, and an Industrial School Home. It has several National and State banks, excellent water power for its factories, and an assessed property valuation of about $10,000,000. Pop. (1890) 17,853; (1900) 24,404; (1910) 39,437.

Kalamazoo College, a coeducational institution in Kalamazoo, Mich.; founded in 1855 under the auspices of the Baptist Church; has endowment funds aggregating over $440,000; grounds and buildings valued at $130,000; volumes in the library, over 13,000; average ordinary income, about $32,000; average number of faculty, 15;

average student attendance, 175; number of graduates, over 450.

Kalanchoe, a genus of *Crassulaceæ*. The leaves of *K. laciniata* are valued as an application to wounds and sores; they allay irritation and promote cicatrization. *K. spathulata* is poisonous to goats. In Kangra, in India, the leaves are burnt and applied to abscesses. *K. brasiliensis* is used in Brazil as a refrigerant. *K. pinnata* is the same as *Bryophyllum calycinum*.

Kaland, a fraternity which originated in Germany in the 13th century, the members of which assembled on the first of each month to pray for their deceased friends and to feast together. Owing to these ceremonies degenerating into excesses, the fraternity was abolished.

Kalapooian, a division of the North American Indians, embracing numerous tribes who formerly occupied the valleys of the Willamette river in Oregon, above the falls. Owing to the ravages of disease and the incursions of the hostile Klikitats, their numbers have been greatly reduced and the remnants, less than 200, are now located on Grande Ronde reservation, Or.

Kalat. See KELAT.

Kalb, Charlotte von (kälb), a German memoir writer, best known as the friend of Schiller, Goethe, and Richter; born in Waltershausen, Grabfeld, July 25, 1761. Schiller's poems "The Conflict" and "Resignation" refer to her. The character of Linda in Richter's "Titan" was drawn from her. Her romance "Cornelia" is in places incomprehensible, which may be said also of "Charlotte" (memoirs, 1879). "Letters to Richter and His Wife" appeared in 1882. She wrote a "History of the American War of Independence." She died in Berlin, May 12, 1843.

Kalbeck, Max (käl'bek), a German playwright; born in Breslau, Jan. 4, 1850. He paid considerable attention to the stage, among other work altering Mozart's "Don Juan" (1887) and writing for Gluck's music a pastoral libretto," "The May Queen" (1888). His discussions of Richard Wagner's "Nibelungen" and "Parsifal" appeared in 1883; "Rhymed and Unrhymed," satirical papers, in 1885; "Old and New," collected poems, in 1890. In some respects his intellectual attitude is Greek.

Ka'eda, in Sclavonic mythology, the god of peace, somewhat similar to the Latin Janus. His feast was celebrated Dec. 24.

Kalee, or **Kali** (kâ'lē), in Hindu mythology, the sacti or consort of Siva in the form of KALA (*q. v.*). She is represented with four arms, one holding a sword, the second a trident, the third a club, and the fourth a shield. A dead body hangs from each of her ears; human skulls strung together form her necklace; and the hands of slaughtered giants interlaced with each other compose her girdle. Her eyebrows are matted and stained with the gore of monsters whom she has just torn to pieces and devoured. She is exceedingly pleased when her altars are inundated with human blood. The Thugs selected her as their tutelary deity. The swinging festival was in her honor. She symbolizes time, and the destruction she effects is the personification of the ravages of time. Her worship seems to have been of Turanian origin, though it is now firmly rooted in modern Brahmanism.

Kaleidophone (-lī'-), an instrument invented by Professor Wheatstone to illustrate the phenomena of waves of sound. A thin, elastic bar is fixed by one extremity, and at its free end carries a silvered or polished ball; a ray of light is reflected from this ball, and when the thin plate is vibrated, the fine point of light describes various curves, corresponding with the musical notes produced by the vibrations.

Kaleidoscope, an instrument which, by means of reflection, enables us to behold an endless variety of beautiful forms of perfect symmetry. It is made by taking two plane mirrors, usually formed of slips of glass, blackened at the back, from 6 to 12 inches in length, and diminishing in breadth from about 3 inches or 1½ inches at one end, to 1 or ¾ inch at the other. Their shape is therefore trapezoidal, but they may be made rectangular with equal success. The mirrors are fixed together by their corresponding sides, so that their reflecting surfaces face each other, and form together any angle that is a sub-multiple of 360° (*i. e.*, 120°, 90°, 72°, 60°). The angle at which they are usually placed is 60°. Thus arranged, the mirrors are set in a conical tube made of brass, tin, or paper, a little larger than the mirrors, and of sufficient diameter at its wider end just to include their points. The small end of the tube is closed, space only being left for an eyehole, which should be in the plane of both the mirrors. At the large end of the tube, and close to the bases of the mirrors, a circular object-box is fixed, of the same diameter as the base of the tube. Its inner side is covered with transparent glass, its outer with ground opaque glass. It is filled with chips of colored paper, colored glass, artificial flowers, beads or small glass tubes filled with colored liquids. The box should be only deep enough to enable the objects within it to fall freely when gently shaken. When the tube is held to the light a circle of variegated pattern, divided into

six sectors of like shape, is always visible, and every time that the tube is revolved, and the relative position of the objects in the box altered, a different pattern is observable. The instrument which was perfected by Sir David Brewster in 1817 (though first invented, under the name of the polyplatin, by Baptista Porta, in the 16th century) is occasionally used by designers of patterns for carpets, wall-papers, or calico and other dress materials. It is also useful as a scientific apparatus for illustrating the optical problem of the multiplication of images produced by reflection, when the object is placed between two plane mirrors inclined at different angles. It has likewise been a favorite toy from the year of its invention. Some varieties of the instrument are as follows:

(1) Polyangular kaleidoscope: Here the reflecting mirrors are so arranged that their angle of inclination can be altered by screws attached to the outside of the tube at pleasure, and it is in this form that the instrument best illustrates the theory of reflection, and therefore is largely used for scientific instruction.

(2) Polycentral kaleidoscope: Here more than two mirrors are employed, but not ordinarily more than four. They may be of trapezoidal shape, and form a hollow pyramid, or rectangular, forming a hollow cube. By this means the images produced by reflection of the objects in the box are greatly multiplied and more complicated patterns formed. Dr. Roget was the inventor of this instrument.

(3) Telescopic kaleidoscope: Here the object box is removed and its place taken by a tube capable of being lengthened or shortened by an external screw, and fitted at its end with a double convex lens. The instrument can thus reflect any objects (trees, flowers, etc.) which are brought into its focus. It was invented by Sir David Brewster.

(4) Debuscope. See DEBUSCOPE.

Kaler, James Otis, pseudonym JAMES OTIS, an American journalist; born in Winterport, Me., March 19, 1848. He published tales for the young, including: "Toby Tyler" (1880); "Left Behind" (1882); "Mr. Stubbs's Brother" (1883), a sequel to "Toby Tyler"; "Silent Pete" (1885); "The Charming Sally"; "The Wreck of the Circus"; etc.

Kalevipoeg (kä-lā'vē-pög) ("The Son of Kalev"), the national poem of the Esthonians, consisting of 20 cantos of popular songs collected into a continuous epic by Kreutzwald (1857–1859).

Kalgan (käl-gän'), a Chinese town, 110 miles N. W. of Peking, built opposite the passage through the Great Wall; one of the chief emporiums of the Chinese tea trade with Mongolia and Siberia, about 21,500,000 pounds being exported from here annually. Textiles and smoked provisions are imported from Siberia and Russia. Pop. 70,000.

Kali (kā'li), in botany, the saltwort, *Salsola kali*. Also a name given by the Arabs to a plant, *Salsola kali*, which grew near the seashore, and from whose ashes they extracted a substance which they called alkali, for making soap. The term kali is used by German chemists to denote caustic potash.

Kali. See KALEE.

Kalidasa (kä-li-dä'sä), a celebrated Hindu poet; his date is variously placed, but most probably he lived about the 6th century A. D. He was called one of the "nine pearls," *i. e.*, one of the nine poets adorning the court of King Vikramaditya. His most famous work, and the one most attractive to modern readers, and greatly admired by Goethe, is the drama "Sakuntala." It portrays a love affair that, after surmounting manifold impediments, ends at last happily, and brings home to us in a wonderful way the essential unity of human nature in all ages. It was translated into English by Sir William Jones in 1789, and by Monier-Williams in 1885, and has been adapted to the German stage. Kalidasa wrote dramatic, epic, and lyric poetry.

Kalil Pasha (kä'lēl pa-shâ'), a grandvizier of Amurath II. He gained the battle of Varna, in 1444, over Ladislaus, King of Hungary, who perished in the fight. He also assisted at the taking of Constantinople by Mahomet II. in 1453, but was soon afterward banished for alleged treason.

Kalinjar, a hill-fortress and hill-shrine in the Northwestern Provinces of India; on an isolated rock (1,230 feet high), the termination of a spur of the Vindhya Mountains, overlooking the plains of Bundelkhand. The records of the place go back to a period of great antiquity, the name Kalinjar occurring in the "Mahâbhârata" as that of a city even at that time famous. The whole rock is thickly studded with ruins of ancient Hindu edifices and other works, including gateways, temples, tanks, caves, statues, inscriptions, etc., the most celebrated of all being the remains of the superb temple of Nil Kantha Mahadeo.

Kalinka, Valerian (ka-lin'kä), a Polish historian, political writer, and journalist; born in 1826. His masterwork, "The Great Diet," was intended to be a thorough study of the political history of Poland; only the first volume appeared (1880). He died in 1886.

Kaliouga (kä-lē-ö'gä), the age of iron in the Hindu chronology. It is important

as commencing the authentic period of Hindu history; the three preceding eras being entirely fabulous. The era of Kaliouga is computed to commence about 3102 B. C.

Kalir (kä'lēr), or **Kaliri** (ka-lē'rē), **Eleazar ben,** a Hebrew poet; born in Kiriat-Sefer in the 8th century. He wrote 150 liturgical chants for use in the synagogue. His religious fame and influence in Italy, Germany, and France were great. He is known as the creator of the Neo-Hebraic poetry, so called; it imitated the Arabic in having, for instance, verses of fixed length, rhyme, and the acrostic.

Kalisch, David (kä'lish), a German comic poet; born in Breslau, Feb. 23, 1820. Of Jewish birth, and intended originally for business, he devoted himself to journalism, beginning as Paris correspondent for German newspapers. Returning to Germany in 1846, he settled eventually in Berlin, where he founded (1848) the Prussian Punch, "Kladderadatsch," with which he was successful for many years. He wrote a series of successful farces. He died in Berlin, Aug. 21, 1872.

Kalisch, Ludwig, a German writer; born in Polnisch-Lissa, Sept. 7, 1814. Among his earlier works were: "The Book of Folly" (1845); "Shadows" (1845); "Tales in Verse" (1845), which to fit diction unite vividness of portrayal; "Shrapnels" (1849). Exiled by the revolution of 1848, he described his new places of residence in "Paris and London" (2 vols. 1851). His later works were: "Bright Hours" (2 vols. 1872); "Pictures From My Boyhood" (1872); "Bound and Unbound" (1876); "Paris Life" (2d ed. 1882); etc. He was the author also of humorous writings and romances. He died in Paris, March 3, 1882.

Kalisia. See KALISZ.

Kalisz (kä'lish), the capital of a province (area, 4,390 square miles; pop. in 1897, 846,719) of the same name in Russian Poland; on the frontier river, the Prosna, 132 miles W. S. W. of Warsaw, with manufactures of cloth. The "Kalisia" of Ptolemy, it is one of the oldest towns in Poland; in its vicinity numerous relics of antiquity have been discovered, and many ancient burial-mounds exist. Two battles have been fought here: on Oct. 29, 1706, King Augustus of Poland routed the Swedes, and on Feb. 13, 1813, the Russians defeated the French and Saxons. Here, too, was signed, Feb. 28, 1813, the treaty of alliance between Prussia and Russia. Pop. 18,804.

Kalium, another name for potassium, whence its symbol K is derived.

Kaliyuga (kä-lē-yö'gä), in Hindu mythology, the last of the four Hindu periods contained in the great Yuga, and corresponding to the "iron age" of classical mythology; it comprised a period of 432,000 solar-sidereal years.

Kalkbrenner, Christian, a German composer; born in Münden in 1755. He resided at Berlin, attached to the court of the Prussian king, but in 1796 went to Paris. His most celebrated works are "Olympus," "Saul," and "Don Juan"; besides which he composed many smaller pieces. He died in Paris in 1806.

Kalkbrenner, Christian Friedrich, a German pianist and composer; born in Cassel, in 1784. He acquired, at an early age, a high reputation as a brilliant performer on the pianoforte. He removed in 1806 to Paris, whence he made frequent professional tours throughout Europe, his fame daily increasing, both from his own performance and the brilliant compositions which he gave to the world. In 1823 he joined M. Pleydel as a manufacturer of keyed instruments, and continued to occupy a prominent position in the musical world till his decease. He died near Paris, France, June 11, 1849.

Kalki (käl'ki), in Hindu mythology, the 10th avatar (incarnation) of Vishnu. Nine are believed to be past; this one is future, and many Hindus look forward to it as Christians do to the Second Advent of our Lord. When Vishnu descends on earth in the form of Kalki, he will destroy all the Mlecchas (barbarians), thieves, and the wicked generally, and re-establish a reign of righteousness on earth. About 1845 a sect sprang up in the Nagpore country called Kalankis. They believed the 10th avatar to have come. They soon died away.

Kall, Abraham (käl), a popular Danish historian; born in Copenhagen in 1743. He became university librarian in 1765, Professor of History 1780, councilor of State 1811. His chief work was a "Universal History" (1776). He died in Copenhagen in 1821.

Kallipolis. See GALLIPOLI.

Kalm, Peter, a Swedish botanist; born in Finland in 1715; was Professor of Botany in Abo and wrote "A Journey to North America" (1753–1761), etc. He died in Abo, Finland, Nov. 16, 1779.

Kalmar. See CALMAR.

Kalmia, a genus of *Ericaceæ,* tribe *Rhododendreæ.* It consists of evergreen shrubs with whorled leaves. The calyx is five-leaved, the corolla cup-shaped; the capsules five-celled, many-seeded. They are found in the United States and in Canada. The leaves of *K. latifolia,* the laurel ivy, spoonwood, or calicobush, are poisonous to many animals, and the flesh of pheasants which have fed on it is said to be delete-

rious to man. A honey-like juice exuding from the flowers brings on phrenetic excitement.

Kalmucks, a Mongolian race of people, scattered throughout Central Asia, and extending W. into Southern Russia. The name is not employed by the people themselves, but by the Turkic races of Asia and the Russians to designate the Dörbön (Derbend) Oirad or Four Allied tribes of the Zungars, Torgod (Keraits or Eleuths), Khoshod, and Dörböd, who live in Zungaria; around Koko-nor in N. E. Tibet; in the district called Ordus, within the great loop of the Yellow river of China; on the W. slopes of the Altai (in Kuldja, etc.), and in the steppes between the Don and the Volga and Caspian. Long before the time of Genghis Khan a part of this people is said to have made an expedition to the W. as far as Asia Minor, and to have lost themselves there among the Caucasus mountains; while the rest, who had remained in Great Tartary, received from their Tartar neighbors the name of Khalimik (the separated). They have oblique narrow eyes, black eyebrows, small flat noses, high cheek bones, large ears, and round heads; they are short in stature, have broad shoulders, and a deeply swarthy complexion. Their ordinary food is barley flour soaked in water, and their favorite drink fermented mare's milk, to which they give the name of Koumiss (*q. v.*), and a spirit distilled from koumiss. They are a nomadic, predatory, and warlike race, and though hospitable, are much given to deceit and thieving. In religion they are nearly all adherents of Lamaism. Their language differs from true or Eastern Mongolian only in being more phonetic; but they have an alphabet of their own. Their literature consists principally of religious books and folk and fairy tales. In recent centuries the most noteworthy events in their history arose out of the emigration of a large band of the Torgod from Zungaria into Russia in 1650. This band was followed by others composed of Dörböd in 1673 and of Khoshod in 1675. Under Ayuka Khan (1670–1724) the Kalmucks figured as an important factor in Russian politics, sometimes as enemies, sometimes as allies. But in 1771 a large body of them, chiefly Torgod and Khoshod, being dissatisfied with the treatment they received at the hands of Russia, returned to the empire of China; after a march in which they endured terrible sufferings they settled at Ili among the Altai Mountains. But there still remain about 110,000 Kalmucks in European Russia; in Asiatic Russia there are probably 55,000 more. The number within the Chinese empire is not known.

Kalna (kal'nä), or **Culna** (kul'-), a town of Bengal, India; 47 miles N. of Calcutta and 28 E. of Bardwan, on the Bhagirathi (Hooghly). The town contains numerous temples, and is a station of the Free Church (Scotland) Mission. It does a large amount of trade by river, chiefly in rice and other natural products.

Kalocsa (kō'loch-o), a town of Hungary, near the left bank of the Danube; 86 miles S. from Budapest. It is the seat of an archbishop (bishop's see from 1000 to 1135), and has a cathedral, an arch-bishop's palace (with a library), some monasteries, and an observatory. The inhabitants grow flax, wine, etc.

Kalousek, Josef (kä-lö'sek), a Bohemian historian; born in Vamberk, April 2, 1838. He was Professor of History at the University of Prague, and an authority on Czech history and literature. His publications include: "Bohemian Constitutional Law" (1871); "Review of the Ethnographic Literature of the Czechs"; "Defense of Wenceslas"; "Biography of Emperor Charles IV. of Bohemia" (1878).

Kalpa, in Hindu chronology, according to some, a day, according to others, a day and night of Brahma, or a period of 4,320,000 or 8,640,000 solar-sidereal years. A great kalpa comprises the life of Brahma. Kalpa Sutra is the name given to those Sanskrit books which treat of the ceremonies of a Vedic sacrifice.

Kalpi (kal'pē), a town in the N. W. provinces of India, near the bank of the Jumna; 50 miles S. W. of Cawnpur. It figured prominently in the wars waged against the Mogul empire, came definitively into British hands in 1806, and was one of the principal agencies of the East India Company. On May 23, 1858, Sir Hugh Rose here defeated 12,000 rebels. Manufactures sugar-candy and paper; exports grain, cotton, etc. (to Cawnpur and to Calcutta).

Kaltenbrunner, Karl Adam (käl'ten-brön-er), a German poet; born in Enns, Dec. 30, 1804. He was author of a number of volumes of poetry in Austrian dialects, his handling of which was masterly. Duke Maximilian, of Bavaria, set a number of his songs to music. His drama, "The Three Firs" (1862), had a stage success. He was for a large part of his lifetime an official in the Vienna government printing house. He died in Vienna, Jan. 6, 1867.

Kaluga (kä-lö'gä), chief town of the Russian province of Kaluga; 76 miles N. W. of Tula and 188 S. S. W. from Moscow; on the navigable Oka river, it carries on an extensive trade, especially in corn. Manufactures leather, oil, bast mats, tallow, candles, etc.; but its specialty is "Kaluga

cakes," sold throughout Russia to the extent of over $500,000 annually. Kaluga has often been a place of banishment for political offenders, among others of Schamyl, the Circassian chief. Pop. (1897) 49,728.

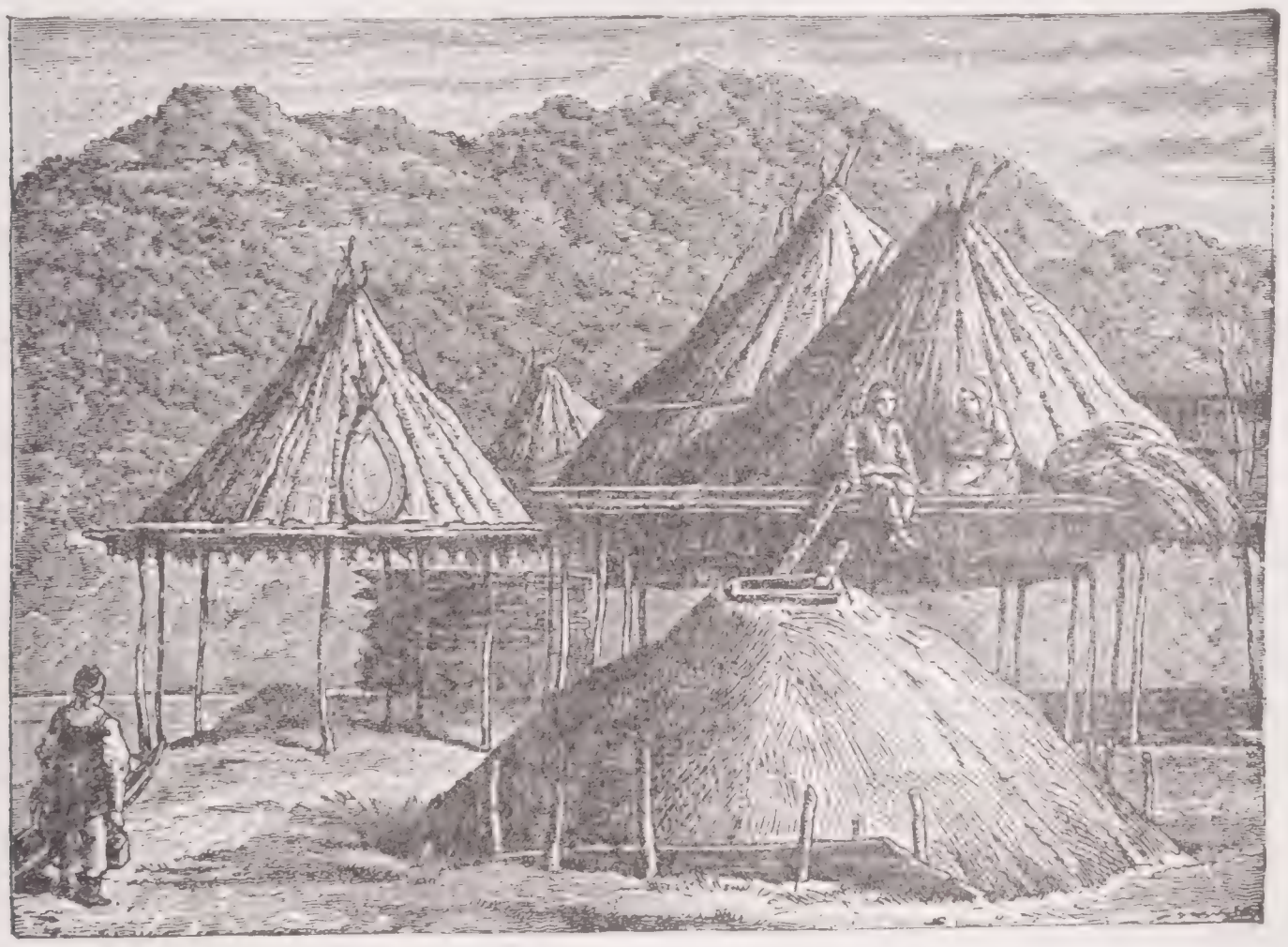
Kama (kä'mä), a river of European Russia, the principal tributary of the Volga, rising in the province of Viatka, near Glazgov, flowing in a S. W. direction, and joining the Volga about 50 miles N. of Kazan; length, 1,400 miles, most of which is navigable. It is connected with a branch of the Dwina by a canal 12 miles long, establishing water communication between the Caspian and White Seas.

Kama (kä'mä), the Hindu god of love, corresponding, generally speaking, to the Greek Eros and Roman Cupid. He appears as a beautiful youth riding on a parrot, generally carrying a bow with a string formed of bees, and having five arrows, each tipped with a flower that is supposed to have some amorous influence. Dancing girls or nymphs bear him company, and one carries his banner, the emblem on which is a fish or marine monster on a red ground.

Kamakura (-kö'rä), a seacoast village of Japan, 12 miles E. of Yokohama; formerly a noted city, founded before 1199, and the seat of the early shoguns; the place has diminished in importance since the middle of the 15th century.

Kamala, the powder, consisting of minute glands, adhering to the capsules of *Rottlera tinctoria*, employed by the natives as a brown dye. Imported from India, and used as a remedy for tape-worm. It is, however, a potent purgative.

Kamaran, a little island in the Red Sea, on the Arabian side, nearly opposite Massowah, with an area of 102 square miles, and inhabited by a few fishermen. The island was annexed by Great Britain in 1858, while the telegraph cable was being laid to Bombay.



SUMMER AND WINTER HUTS OF KAMCHATKA NATIVES.

Kambalu (-bä'lö), **Kambaluc,** or **Cambaluc** (-bä'lök), the capital of China and the residence of the Mongol emperors 1234–1368. It partially corresponded with the part now called the "Tartar City" in Peking, was visited by Marco Polo, etc., in the 13th century, and made the seat of an archbishopric by Pope Clement V. in 1314.

Kamchatka (käm-chat'kä), a peninsula of Eastern Siberia, stretching S. into the Pacific between Bering Sea on the E. and the Sea of Okhotsk on the W.; area, 465,590 square miles; pop. 6,500, made up of Kamchadales, Koryaks, Lamuts, and a few Russians. The peninsula is long and narrow, swelling out toward the middle, and terminating in a point only seven miles distant from the northernmost of the Kurile Islands. A chain of volcanic mountains runs down the center and reaches 15,408

feet in Kojerevska and 16,988 in Kluchefskaya. The latter was in active eruption at least twice in the 19th century (1854 and 1885). Hot springs abound. The coast on the S. E. is formed of rugged, precipitous cliffs. The principal river is the Kamchatka, which flows into the Pacific. The climate is colder than in corresponding latitudes in Europe, and very humid; grass and tree vegetation are luxuriant. The principal occupations of the inhabitants are fishing and hunting. Furs are the most valuable production of the peninsula. The most useful domestic animal is a peculiar kind of dog, which is employed in hunting and sledging. Kamchatka was annexed to Russia at the end of the 17th century, after the expedition of the Cossack chief Atlasof. The Kamchadales — the preponderating race (2,000 in number) — live mostly in the S. They are a hardy people, who dwell in winter in earth pits and in summer in light huts. Their language has no known cognates; but they are now almost completely Russianized. The fort of Petropaulovsk (pop. 350), with a magnificent harbor that is covered with ice only during a brief period of the year, is picturesquely situated on the E. coast. A British and French fleet made an unsuccessful attack on the place in 1854; since then it has not been fortified.

Kamehameha (kä-me-hä′me-hä) **I.,** surnamed THE GREAT; King of the Sandwich Islands; born in 1753. He subdued and governed the whole group of the Sandwich Islands, having been first made King of Hawaii in 1781. He was progressive in his views and encouraged intercourse with Europeans. He died in Kailua, Hawaii, May 8, 1819.

Kamehameha II., King of the Sandwich Islands (1819–1824), son of Kamehameha I.; born in Hawaii in 1797. He permitted the establishment of an American Protestant mission in 1820. He died in London, July 14, 1824.

Kamehameha III., King of the Sandwich Islands (1824–1854), brother of Kamehameha II.; born March 7, 1814. He introduced a constitutional form of government in 1840. He died in Honolulu, Dec. 15, 1854.

Kamehameha IV., King of the Sandwich Islands, nephew of Kamehameha III.; born Feb. 9, 1834. He succeeded his uncle in 1854, and died in Honolulu, Nov. 30, 1863.

Kamehameha V., King of the Sandwich Islands, brother of Kamehameha IV.; born Dec. 11, 1830. He succeeded his brother in 1863, and proclaimed a new constitution in 1864. He died in Honolulu, Dec. 11, 1872.

Kameke, Georg Arnold Karl von (kä′-me-ke), a Prussian military officer; born June 14, 1817. He entered the army in 1834, and after rising through various grades took part as Major-General and chief of staff of the 2d army corps in the war with Austria (1866); in the Franco-Prussian war (1870–1871) occasioned the battle of Saarbrücken (Aug. 6, 1870); was present at the battles of Aug. 14, 16, and 18; was ordered to besiege Mezières and Longwy; and superintended the works at the siege of Paris; minister of war 1873–1882. He died in Berlin, Oct. 12, 1892.

Kamenetz-Podolski (kä′me-nets-pō-dōl′-skē) (Polish Kamieniec), capital of the Russian province of Podolia; near the frontier of Austrian Galicia, on a steep rock above the Smotritza river; 243 miles N. W. of Odessa and 40 N. E. of Czernowitz. It has a Roman Catholic cathedral (1361), a Greek cathedral (16th century), and an Armenian and several other churches. The town was destroyed by the Mongol chief Batu in 1240; taken by the Turks in 1672; returned to the Poles in 1699; and annexed by Russia in 1795. Previous to the partition of Poland, Kamenetz was one of the strongest bulwarks of that country against the Turks. Pop. (1897) 34,483.

Kamenetz. See PODOLIA.

Kamenz (kä′ments), a small manufacturing town of Saxony, 22 miles N. E. of Dresden. It was the birthplace of Lessing. Pop. 7,211.

Kamerun (kä-me-rön′) (1) a district on the W. coast of Africa, on the Bight of Biafra, now belonging to Germany, and one of the most suitable districts for colonization in this region. (2) A river in the Kamerun territory. It falls into a broad estuary, on approaching which it has a width of about 400 yards. There are several large and thriving towns (including King Bell's town) on the river, through which an extensive trade is carried on in ivory and palm-oil. (3) A mountain range in the territory, the highest peak of which has been estimated at over 13,000 feet. It is volcanic in character, and is clothed with a dense growth of forest to the height of 4,000 or 5,000 feet.

Kames, the name given by geologists to banks and ridges of gravel, sand, etc., associated with the glacial deposits of Scotland.

Kames, Henry Home, Lord, a famous Scotch author and jurist; born in Kames, Berwickshire, in 1696; educated at the University of Edinburgh, after nearly 30 years' practice as a lawyer he became judge in 1752. Besides important legal works, he wrote on antiquities, metaphysics, ethics, religion, æsthetics, education, agriculture,

etc. His chief literary production, "Elements of Criticism" (3 vols. 1762), forestalled, as regards works of the imagination, the modern psychological school. Of this book Goldsmith said it was "easier to write than to read." Like his contemporary, Lord Chesterfield, he was a great social favorite. He died in Edinburgh, Dec. 27, 1782.

Kami (kā′mē), in Japanese mythology, the name of certain spirits or divinities, the belief in which seems to have characterized the ancient religion of that country before it became intermingled with foreign doctrines, and still constitutes its basis. The kami are believed to be partly elemental, subordinate to the deities of the sun and moon, and partly the spirits of men — in fact, every natural agent and phenomenon is supposed to have its own spirit or genius. The spirits of human beings survive the body, and, according to the actions of the individual in life, receive reward or punishment. When a man's life has been distinguished for its piety or for the good he has done to his fellow-men, after death he is deified, and his kami is worshiped. The number of these kami at the present day is estimated at 3,000, and they are worshiped in temples without statues or images. Each kami is represented by a mirror, as the emblem of purity; and all the rites and ceremonies seem to be typical of purification. The priests who superintend the worship of these temples are called *kannushi*, or the ministers of the spirits.

Kampen (käm′pen), a town of Holland; near the mouth of the Yssel; 5½ miles N. W. of Zwolle. It was formerly a Hanse town and had a considerable trade, which gradually left it as the mouth of the Yssel sanded up. But since the middle of the 19th century the river approaches have been improved, and the trade of the town is reviving. The church of St. Nicholas is one of the finest mediæval churches in the country. The inhabitants are engaged in shipbuilding, commerce, fishing, and tobacco manufacture. Kampen is the Gotham of the Dutch. Pop. about 20,000.

Kampen, Nikolaas Godfried van, a distinguished Dutch historian; born in Haarlem, May 15, 1776. The son of a gardener, having laid the foundation of vast learning while clerk in a book-store, he became editor and finally Professor of English and German in the University of Leyden (1815). Many of his historical and literary works were translated into German, their reputation becoming European. "History of the Literature of the Netherlands" (1812); "History of French Domination in Europe" (8 vols. 1815–1823); "History of the Influence of the Netherlands Outside of Europe" (3 vols. 1831–1833), are among his finest works. He died in Leyden, March 15, 1839.

Kamptulicon, a floor-covering made of india-rubber, gutta-percha, and cork. The two former having been liquefied, the other is added in the form of fine dust. The mixture, while warm and soft, is pressed into sheets between rollers. It is very elastic, and is printed like floor-cloth.

Kanagawa (-gä′wä), a seaport of Japan, on the W. shore of Tokyo Bay, the first Japanese port opened to foreign trade in 1859; pop. about 10,000.

Kanakas (ka-nak′äz), the native inhabitants of the Sandwich Islands; in New Caledonia and the New Hebrides the name is applied to all the native laborers, without distinction of origin.

Kanari (kä-nä′rē) **Oil,** an oil yielded by the fruits of *Canarium commune*, a tree of the Indian Archipelago and Southeastern Asia, often called Java almond. The oil is used for culinary purposes and for burning, and is deemed superior to cocoanut oil.

Kanaris, Constantine (kä-nä′ris), a Greek naval officer; born in the Isle of Ipsara in 1785. After distinguishing himself in the Greek war of independence he was appointed to important commands by the Greek president, Capo d'Istrias, was made senator in 1847, and was minister of marine (1854–1855). He took part in the revolution of 1862 and held office repeatedly under the new king. He died Sept. 15, 1877.

Kanauj (ka-nouj′), one of the great legendary centers of Aryan civilization in India, to which the Hinduism of Lower Bengal attributes its origin; it stood originally on the Ganges, 65 miles N. W. of Lucknow. At present the site consists of a vast number of ruins, extending over the area of five villages, about four miles from the Ganges, the river having slightly altered its bed. The most remarkable buildings are Mohammedan mausoleums. Among the ruins there is a modern town; pop. about 17,000.

Kanawha Court House. See CHARLESTON.

Kanawha River. See GREAT KANAWHA RIVER.

Kandahar, or **Candahar** (kän-dä-här′), the capital of Central or Southern Afghanistan; about 200 miles S. W. of Kabul; 3,484 feet above sea-level. It is in the form of an oblong square, while all its streets run straight and cut one another at right angles. At the point of intersection of the two main streets there is a large dome (*Charsu*), 50 yards in diameter. Kanda-

har is well watered by two canals drawn from a neighboring river, which send to almost every street its own adequate supply; and the same means of irrigation have covered the immediate vicinity with gardens and orchards. Kandahar is a commercial center, trading with Bombay, Herat, Bokhara, and Samarcand. It has been a pivot for the history of that part of Asia during more than 2,000 years. It is supposed to have been founded by Alexander the Great. Mahmud of Ghazni wrested it from the Afghans. From that epoch down to 1747, when the native rule was permanently established, Kandahar, with brief and precarious intervals of independence, was held by Genghis Khan, Tamerlane, and by various rulers of Tartary, India, and Persia in turn. In the war of 1878–1880 the British entered Kandahar unopposed, and they held the city till 1881, some months after they had evacuated the rest of Afghanistan. Through its being approached by the Sibi-Pishin Railway on the S., Kandahar has greatly increased in political as well as in commercial importance. Pop. variously estimated at from 25,000 to 100,000.

Kandavu, one of the Fiji Islands.

Kandele, or **Kantele,** the ancient minstrel's harp of the Finns; the name is also given to a species of dulcimer, having five strings, in use among the same people.

Kandy. See CANDY.

Kane, Elisha Kent, an American explorer; born in Philadelphia, Pa., Feb. 3, 1820; was graduated at the Medical Department of the University of Pennsylvania in 1842; joined the United States navy as assistant surgeon in 1843; accompanied the Grinnell expedition in search of Sir John Franklin in 1850–1852. His fame as an Arctic explorer rests on his second expedition in search of Franklin in 1853–1855. He sailed from New York on May 30, in the former year, in the brig "Advance," and reached lat. 78° 43′ N. the highest point ever attained up to that time by a sailing vessel. The hardships endured during this second trip so affected his health that he died in Havana, Cuba, where he had gone to recuperate, Feb. 16, 1857. He was the author of "The United States Grinnell Expedition in Search of Sir John Franklin" (1854), and the "Second Grinnell Expedition" (1856).

Kane, Sir Robert, a British chemist; born in Dublin, Ireland, in 1810. He was educated for the medical profession; in 1832 became a member of the Royal Irish Academy; in the same year projected the "Dublin Journal of Medical Science"; in 1840 received the gold medal of the Royal Society of London for his researches into the coloring matter of lichens; in 1847 the Cunningham Gold Medal of the Royal Irish Academy for his discoveries in chemistry; 1834–1837 was Professor of Natural Philosophy to the Royal Dublin Society; in 1846 originated the Museum of Industry in Ireland, was appointed its first director, and the same year was knighted; was for a number of years president of Queen's College, Cork, resigning the presidency in 1873, together with the directorship of the museum; in 1876 was elected president of the Royal Irish Academy. He wrote "Elements of Chemistry" (1842); "Industrial Resources of Ireland" (1844); etc. He died Feb. 16, 1890.

Kanem (kä-nem′), a district of Central Africa, N. and N. E. of Lake Tchad, now belonging to Bornu, but formerly an independent State.

Kangaroo, the genus *Macropus,* and specially the great kangaroo, *M. giganteus.* This species was the first known of the family, having been seen by a party of sailors whom Captain Cook sent ashore on the coast of New South Wales to seek fresh provisions for the sick on board his vessel. On their representations Captain Cook and Mr. (afterward Sir Joseph) Banks landed, and after a time a specimen was shot. (For its dentition see *Macropus* and *Macropodidæ.*) The great kangaroo has large hind legs, with a huge tail, short fore limbs, and is about the height of a man. It is a vegetable feeder, and is destructive to the crops of the settlers in the less inhabited parts of Australia; in the long-settled districts it is much rarer. Its chief foes are man and a native dog called the dingo. Its ordinary method of progression is by a series of great leaps, 10 to 15 feet or more. If when infuriated it can overcome an adversary it will seize him by its fore feet, hug him like a bear, and rip him with the claws

KANGAROO.

of its hind feet, or taking him to a water hole hold him under water till he is drowned. Many other species exist. The hare kangaroo or turatt is *M. leporoides;* the great rock kangaroo, *M. robustus;* the red kangaroo, *M. rufus;* the agile kangaroo, *M. agilis;* the brush-tailed rock kangaroo, *M. penicillatus*; and the tree kangaroo, *Dendrolagus ursinus.*

Kangaroo Apple, a species of *Solanum* (*S. laciniatum*), with a somewhat shrubby succulent stem, smooth pinnatifid or entire leaves, and lateral racemes of flowers; a native of Peru, New Zealand, Australia, and Tasmania, in which latter countries its fruit is called kangaroo apple, and is used as food. When unripe it is acrid and produces a burning sensation in the throat; but when perfectly ripe it is wholesome.

Kangaroo Grass, the most esteemed fodder grass of Australia. It grows to a height much above that of the fodder grasses of Great Britain, affords abundant herbage, and is much relished by cattle. The genus is allied to *Andropogon,* and has clusters of flowers with an involucre. The awns are very long and twisted, both in the kangaroo grass and in a nearly allied species, *A. ciliata,* which is one of the most esteemed fodder grasses of India.

Kang-Hi, Emperor of China. He succeeded Shun-chi, founder of the Mantchou dynasty, in 1669. He had a great love for the arts and sciences of the Europeans, and liberally patronized the missionaries; but, though he was fond of geography, and directed the construction of maps and charts, he would suffer none to be laid before him unless China was represented therein as the middle of the world. He was a voluminous writer, and composed, among other works, "Maxims for State Government," and "Moral Instructions for my Son." He died in 1693.

Kangra (kän'grä), a district of Hindustan, in the Punjab, belonging mainly to the Himalayan chain; area, 9,069 square miles; pop. 730,845. About a ninth is under cultivation, and large tracts are covered with forests. The inhabitants are a good-looking, fair-complexioned race, mild and peaceable, and much attached to their country.

Kanin, a peninsula in Russia, between the White Sea and the Gulf of Tcheskaya. It extends into the Arctic Ocean and its extremity is called Cape Kanin.

Kanishka, the name of one of three Kings of India, said to have ruled in Kashmir. They had large dominions and were zealous Buddhists, and reigned just before and after the birth of Christ. The names of two of them, Hushka and Kanishka, are found on coins and in inscriptions. Of the third, Jushka, no record except his name is found. It was during the reign of Kanishka that the fourth Buddhist Council was held, from which originated the Northern School of Buddhism.

Kanitz, Philipp Felix (kä'nits), a Hungarian explorer; born in Budapest, Aug. 2, 1829. His series of works on Servia, Bulgaria, Herzegovina, Montenegro, etc., beginning in 1862, gave him a brilliant reputation, and have spread greatly the knowledge of Slavic countries. He was the first to draw correct maps of Bulgaria and the Balkans.

Kankakee, a city and county-seat of Kankakee co., Ill.; on the Kankakee river, and the Illinois Central and other railroads; 56 miles S. W. of Chicago. It is an important railroad junction and trade center, is principally engaged in the manufacture of horseshoe nails, has an excellent system of waterworks supplied from the river, and contains the Illinois Eastern Insane Hospital, Emergency Hospital, conservatory of music, public library, and National and private banks. The tax valuation is about $6,500,000. Pop. (1890) 9,025; (1900) 13,595; (1910) 13,986.

Kan-Kiang, a river of China, which traverses the province Kiang-si from S. to N., and after a course of 350 miles flows into the Yang-tse-Kiang.

Kannegiesser, Karl Ludwig (kän'negē-ser), a German writer; born in Wendemark, Altmark, May 9, 1781. He is best known as the translator into German of Chaucer, Beaumont and Fletcher, Byron, Scott, Dante, Madame de Staël, etc. He died in Berlin, Sept. 14, 1861.

Kano (kä-nō'), capital of a province of the same name (called the "Garden of Central Africa"; pop. est. 500,000), in the Negro State of Sokoto, Central Africa; in the middle of the country, about 250 miles S. S. E. of the city of Sokoto. The wall surrounding Kano is 15 miles in circuit, and embraces, besides houses, gardens and cultivated fields. Principal industry weaving and dyeing of cotton cloths. Pop. about 30,000.

Kansas, a State in the North Central Division of the North American Union; bounded by Nebraska, Missouri, Indian Territory, Oklahoma, and Colorado; area, 81,700 square miles; admitted to the Union Jan. 29, 1861; number of counties, 106; pop. (1890) 1,427,096; (1900) 1,470,496; (1910) 1,690,949; capital, Topeka.

Topography.—The State, lying in the great central plain of the United States, has a generally flat or undulating surface. Its altitude above the sea ranges from 750 feet at the mouth of the Kansas river to 4,000 feet on the W. line of the State. The rivers flow through bottom-lands, varying from ¼ to 6 miles in width, and bounded by bluffs rising 50 to 300 feet. The Mis-

souri river forms nearly 75 miles of the State's N. E. boundary. The Kansas river, formed by the junction of the Smoky Hill and Republican rivers, joins the Missouri at Kansas City, after a course of 150 miles across the State. The Arkansas, rising in Colorado, flows with a tortuous course, for nearly 500 miles, across three-fourths of the State. It forms, with its tributaries, the Little Arkansas, Walnut, Cow Creek, Cimarron, Verdigris, and Neosho, the S. drainage system of the State. Other important rivers are the Saline and Solomon, tributaries of the Smoky Hill; the Big Blue, Delaware, and Wakarusa, flowing into the Kansas; and the Osage, a tributary of the Missouri.

Geology.— The rock system of Kansas is exceedingly simple. Over almost the entire State the rocks are monoclinal and dip gently to the W. N. W., at an average rate in the E. and central portions of the State of about 15 feet to the mile, or about double the average slope of surface to the E. In the W. part of the State the strata lie horizontally. The geological formations succeed each other in a regular ascending series, from S. E. to N. W. The outcrops begin with the sub-Carboniferous, in a small triangular tract not exceeding 60 square miles in extent, in the S. E. corner of the State; followed by the Carboniferous, covering the E. quarter of the State; the Permian, or more properly the permo-Carboniferous, in the E. middle, covering a belt about 60 miles wide, extending from Marshall county S. to Cowley and Sumner counties; the Triassic, embracing a triangular tract of about seven counties S. of the Arkansas river, with its apex in the great bend of the Arkansas and its base along the S. line of the State from Sumner county to Clark; the Cretaceous, in the W. middle, covering about one-third of the State, from Washington, Republic, Jewell, and Smith counties, on the N. line of the State, S. E. to the Arkansas river and the S. W. corner of the State; and end with the Tertiary, covering about 20 counties in the N. W. quarter of the State, with occasional tracts in the S. W. and S. There is a very small amount of post-Tertiary or recent formation in the valleys, scattered over the middle and W. portions of the State. Glacial drift covers the Permian and Carboniferous in the N. E. corner of the State as far W. and S. as the Big Blue and Kansas rivers.

Minerals.— The minerals of Kansas are lead and zinc, obtainable from the sub-Carboniferous; bituminous coal, petroleum and gas, from the Carboniferous; salt and gypsum from the Permian and Triassic; chalk and lignite from the Cretaceous; lignite and silica in an exceedingly fine state from the Tertiary.

Fossils.— The fossils of the Carboniferous formation are all marine, consisting of foraminifera, sponges, crinoids, brachiopods, and lamellibranchs. They are quite numerous, limestone rocks in some places being solidly full of their shells. The Cretaceous fossils consist of marine and fresh water shells, fishes, saurians, turtles, birds, and impressions of leaves of aërial plants and trees such as fig, laurel, magnolia, and other trees of sub-tropical climate; poplar, willow, birch, and other trees of colder climate; together with walnut, oak, sycamore, and other trees similar to those of the present day. In the recent formations are found remains of horse, elephant, mastodon, and other mammals of great size.

Mineralogy.— In 1899 the principal mineral productions of Kansas were coal 4,096,895 tons, valued at $5,124,248; coke, valued at $250,000; sandstone, valued at $49,629; limestone, valued at $250,000; salt, 2,172,000 barrels, valued at $760,200; natural gas, valued at $257,500; and petroleum 69,556 barrels, valued at $52,167; oil refined, including gasoline and fuel oil, valued at $225,760; zinc 32,354.2 tons, valued at $3,720,733; lead 4,992.6 tons, valued at $449,344; clay products, valued at $415,730; gypsum cement plaster, 61,103 tons, valued at $262,743. Other mineral products of the State include sulphur, chalk, alum, portland cement, manganese, lime, marble, kaolin, gypsum, ochre, fire and brick clays, brown hematite, and numerous other ores of iron. The State ranks fourth in the United States in the production of salt, and ninth in coal.

Smelting Products.— Zinc smelting 52,664 tons, valued at $6,056,360; lead smelting 1,666.6 tons, valued at $150,000; Argentine refinery, valued at $20,028,385.

Soil.— The soil is exceptionally rich in those mineral substances necessary to support vegetation, and is consequently very fertile. In the E. it consists of a black sandy loam with a vegetable mold, and in the W. it is of a lighter color but greater depth. The bottom lands have a soil from 2 to 10 feet in depth, and the hills, from 1 to 3 feet. Only a small portion of the State is wooded, the most abundant trees being the ash, cottonwood, oak, elm, walnut, hickory, maple, mulberry, sycamore, box elder, willow, cherry, redbud, and pecan.

Agriculture.— The excellent soil of Kansas makes it one of the foremost agricultural States. In 1900 the principal farm crops were corn, 163,870,630 bushels, valued at $52,438,602; wheat, 82,488,655 bushels, valued at $45,368,760; hay, $4,031,461 tons, valued at $18,343,148; oats, 43,603,943 bushels, valued at $9,904,707; potatoes, 7,246,224 bushels, valued at $3,478,188; barley, 4,186,802 bushels valued at $1,381,645; and rye, 1,922,481 bushels, valued at $826,667. About 100,000 pounds of cotton are produced annually. About 35,000,000 acres of

KANSAS

Indian Reservation Boundaries
Military Reservation Boundaries

State Capital ⊛ County Seats ⊙
Size of type indicates relative importance of places.

SCALE OF MILES
0 10 20 30 40 50

Hammond's 8 x 11 Map of Kansas.
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98° E 97° F 96° G 95° H
1
2
3
4
5
40°
39°
38°
37°
98° from E Greenwich 97° F 96° G 95° H
IOWA
MISSOURI
NEBRASKA
OKLAHOMA
REPUBLIC
WASHINGTON
MARSHALL
NEMAHA
BROWN
DONIPHAN
CLOUD
CLAY
RILEY
POTTAWATOMIE
JACKSON
ATCHISON
LEAVENWORTH
JEFFERSON
WYANDOTTE
OTTAWA
GEARY
SHAWNEE
DOUGLAS
JOHNSON
SALINE
DICKINSON
MORRIS
WABAUNSEE
OSAGE
FRANKLIN
MIAMI
MC PHERSON
MARION
CHASE
LYON
COFFEY
ANDERSON
LINN
HARVEY
BUTLER
GREENWOOD
WOODSON
ALLEN
BOURBON
SEDGWICK
ELK
WILSON
NEOSHO
CRAWFORD
SUMNER
COWLEY
CHAUTAUQUA
MONTGOMERY
LABETTE
CHEROKEE
Fairmont
Crete
Hickman
Exeter
Geneva
Clay Center
Edgar
Tobias
Wilber
Dewitt
Tecumseh
Auburn
Watson
Phelps Cy.
Rockport
Langdon
Burlington Jc.
Maryville
New Conception
Albany
Nemaha
Corning
Belvidere
Beatrice
Virginia
Hebron
Fairbury
Wymore
Pawnee City
Falls City
Bigelow
Napier
Oregon
Superior
Warwick
Savannah
Maysville
Amazona
St. Joseph
Osborn
Missouri River
Republic
Belleville
Mahaska
Hanover
Marysville
Washington
Blue Rapids
Frankfort
Sabetha
Seneca
Hiawatha
Horton
Troy
Atchison
Holton
Concordia
Clay Center
Manhattan
Wamego
Ft. Leavenworth
Leavenworth
Kansas Cy.
Rosedale
Argentine
Minneapolis
Junction City
Abilene
Topeka
Lawrence
Olathe
Salina
Council Grove
Ottawa
Paola
Osage City
Emporia
Herington
Osawatomie
McPherson
Marion
Cottonwood Falls
Burlington
Garnett
Mound City
Pleasanton
Newton
Eldorado
Eureka
Yates Center
Iola
Fort Scott
Wichita
Fredonia
Chanute
Girard
Pittsburg
Parsons
Wellington
Winfield
Arkansas City
Independence
Oswego
Coffeyville
Columbus
Galena
Caldwell
Medford
Jefferson
Lamont
Newkirk
Blackwell
Tonkawa
Ponca
Kaw
Pawhuska
Bartlesville
Vinita
Miami
Claremore
Pond Creek
Kremlin
N. Enid
Enid
Breckinridge
Fairmont
Luella
Perry
Pawnee
Ralston
Skedee
Osage
Owasso
Oolegal
Chelsea
Dawes
Afton
Bluejacket
Welch
Arkansas R.
Grand R.
Verdigris
Spavinaw Cr.
Hominy
Black Bear Cr.

Kansas

prairie land are devoted to grazing purposes. The stock yards and packing establishments at Kansas City ship canned meats to all parts of the world. In 1900 the farm animals were horses, 786,888, valued at $39,344,400; mules, 89,064, valued at $5,343,840; sheep, 200,301, valued at $600,903; milch cows, 712,582, valued at $23,515,206; and other cattle, 2,443,043, valued at $60,933,000; swine, 2,286,734, valued at $13,720,404. In cattle raising Kansas ranked third in the United States in 1899. The stock yards at Kansas City, Kansas, received from Kansas during the year 1900, 1,151,327 cattle, 1,993,984 hogs, 310,366 sheep, and 36,368 horses and mules; total shipments from the yard to all points: Cattle 2,081,096, hogs 3,096,091, sheep 860,517, horses and mules 102,579.

Manufactures.— In 1900 there were reported by the United States census, 7,830 manufacturing establishments, employing $66,827,362 in capital, and 35,193 persons; paying $129,413 in wages, and $129,485,320 for raw materials; and having an annual output valued at $172,129,398. The chief manufacturing establishments are located at Kansas City, Argentine, Topeka, Leavenworth, and Wichita. The principal articles of manufacture include cured and packed meats, flour and grist, railroad cars, dairy products, foundry and machine shop products, masonry, millinery, books, saddlery and harness, soap and candles, tobacco and cigars, and refined zinc.

Banking.— On Oct. 31, 1901, there were 110 National banks in operation, having $8,634,000 in capital, deposits $29,195,000, and loans $24,782,000. There were also 360 State banks and 50 private banks, in all 410, having a total deposit of $37,651,945.60, and $2,884,623.10 surplus and profits, a total cash and sight exchange of $1,9052,941.89, and loans and discounts amounting to $25,503,768.05. The total capital of these banks was $6,960,400.

Education.— In 1900 the school population was 508,854, the enrollment in the public schools, 389,582, and an average daily attendance of 261,783. There were 9,256 public school buildings; 11,297 teachers, public school property valued at $10,417,392.00; receipts of the year, $5.277,702.11; and expenditures, $4,622,363.76. The State institutions of learning were the State University at Lawrence, attendance 1,251, State Normal School at Emporia, attendance 1,993, State Agriculture College at Manhattan, attendance 1,123. For higher education there were 181 public high schools, 15 private secondary schools, 5 private normal schools, 4 business colleges, 2 schools of oratory, and 22 colleges and universities for both sexes; the Oswego College for Young Ladies at Oswego, and the College of the Sisters of Bethany at Topeka. Among the most noted colleges were the Baker University at Baldwin, Washburn College at Topeka, Campbell University at Holton, St. Mary's College at St. Mary's, Ottawa University at Ottawa, Southwest Kansas College at Winfield, Bethany College at Lindsborg, and McPherson College at McPherson.

Churches.— The strongest denominations in the State are the Methodist Episcopal; Roman Catholic; Regular Baptist, North; Disciples of Christ; Presbyterian, North; United Brethren; Congregational; Friends; and Lutheran, General Council. In 1889 there were 4,601 Evangelical Sunday-schools with 43,073 officers and teachers and 282,379 scholars.

Postoffices, Periodicals, and Railroads.— In 1901 there were 1,682 postoffices of all grades, and 837 periodicals, of which 51 were daily, 4 semi-weekly, 634 weekly, 14 semi-monthly, 2 bi-monthly, 116 monthly, 11 quarterly, and 5 occasional. The total length of railroads was 8,808 miles.

Finances.— The assessed valuation of all taxable property in the State in 1900 was $340,611,098, and the tax rate $5.50 per $1,000. The total bonded debt, limited by law to $1,000,000, was on March 10, 1901, $667,000, all of which was held by State bonds.

State Government.— The governor is elected for a term of two years, and receives a salary of $3,000 per annum and his residence. Legislative sessions are held biennially and are limited to 50 days each. The Legislature has 40 members in the Senate, and 125 members in the House, each of whom receives $2 per day and mileage. There are 8 Representatives in Congress. The government in 1904 was Republican.

History.— Kansas was included in the Louisiana Purchase of 1803, and is believed to have been visited by an army of Spaniards and Indians in 1541. It was explored by the French in 1724, and by Lieut. Zebulon M. Pike, of the United States army, in 1806. It was made a Territory in 1854, and disputes between the slavery and abolition parties made Kansas a scene of bitter partisan conflict. The repeal of the Missouri Compromise of 1820 opened a new field for the extension of slavery, of which the slaveholders of Missouri and the South hastened to avail themselves, while the anti-slavery party of the North made equally vigorous efforts to people the new Territory. The result was a series of conflicts which continued for four years, fights taking place, towns being burned, and illegal voting freely indulged in. In the end the party opposing slavery triumphed; a constitution excluding slavery was adopted in 1859, and Kansas was admitted as a State, Jan. 29, 1861. During the Civil War the Confederate guerillas were active in

Kansas City

E. Kansas. In 1893 the Republicans and the populists, as the result of disputed elections, organized separate legislatures. This factional dispute was finally settled by the militia and the courts. The development of the oil region brought about strong antagonism between the Standard Oil Co. and independent producers. In 1904-05 the legislature declared the pipe-lines of the Standard Co. common carriers, and determined freight rates.

Kansas City, a city of Kansas, the largest city in the State; county-seat of Wyandotte co. It is situated in the N. E. part of the State, at the Missouri line, opposite to and adjoining Kansas City, Mo., at the confluence of the Missouri and Kansas rivers, and covers an area of nearly 11 square miles. Numerous bridges unite the two cities, which are really one commercially and industrially. Electric lines connect with the suburbs, the largest of which are Rosedale and Argentine to the S. On the W. are the suburbs of Quindaro, Cissna Place, Midland Park, Chelsea Place, Grace Hill, Silver Springs, and Ivorydale. The population of the city and its suburbs in 1906 was estimated at 117,000.

Topography and Institutions.—The bulk of the city lies in the peninsula formed by the confluence of the rivers, but a small part is to the E. of the Kansas river, and there a street marks the dividing line between the adjoining cities. The city is built partly on the river flats, and partly on the bluffs overlooking the rivers and the level land extending beyond the bluffs. The stockyards, the second largest in the country, are near the dividing line between the two cities. The principal public buildings are the Carnegie Library, High School, and Federal buildings. There are nearly 100 churches, representing some twenty denominations, among which St. Mary's (R. C.) and St. Anthony's (R. C.) are architecturally conspicuous. The charitable institutions include the hospitals of St. Margaret (R. C.), Bethany (Meth.), and Douglass (for negroes), the State institution for the blind, and the Children's Home. The public school system had in 1905-06 an enrollment of 10,500 pupils, of whom nearly 1,000 were in the high school. The number of teachers was 222, and the cost of maintenance was $179,000. The Roman Catholic parochial schools have over 2,000 pupils. The higher institutions of learning include the Kansas City University (Meth. Prot.), with over 200 students, the Baptist Theological Seminary, and the Medical School of the University of Kansas. The Sumner High School and the Western University and Industrial School are for negroes, the latter institution offering courses in higher education as well as manual training. The public library has 12,000 volumes.

Industries.—The city is by far the most important industrial center in the State, and greatly excels the adjoining city in the total value of its products, although it is somewhat inferior to the latter in the capital invested and number of wage-earners. The leading industry is slaughtering and meat packing, which, according to the United States Census of Manufactures of 1905, employed $22,024,000 of capital and 8,637 wage-earners (exclusive of salaried officials and clerks), who received $4,465,000 in wages, used materials valued at $78,367,000, and turned out products valued at $88,446,000. Other important industries include flour and grist mills, foundry and machine shop products, iron and steel works, wirework, lumber and planing mills, furniture, carriages, saddlery and harness, oleomargarine, paints, soap, fertilizers, etc. The industrial growth of the city since 1880 is shown in the following table:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1880	224	$2,147 000	2,548	$1,421.000	$3,724,000	$6,383,000
1890	1,478	14 105.000	12,611	7,445.000	16,361,000	31,936.000
1900	1,797	26,437,000	15,381	7,784,000	18,214,000	36,527,000

The special United States Census of Manufactures of 1905 was confined to factory industries, to the exclusion of neighborhood industries and hand trades. Compared with the corresponding figures for 1900, the results are shown in the following table:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1900	114	$18,236,000	9,483	$4,259,000	$68,875,000	$80,023,000
1905	100	27,773,000	10,529	5,449,000	83,883,000	96,473,000
Per cent. increase		52.3	11.0	28.0	21.8	20.6

Natural gas is piped direct to the city and is used in industrial establishments, as well as in offices and homes.

Commerce and Transportation.—The commercial interests of the two cities are so closely related that it is impossible to present them separately, and the following figures relate in part to both cities. The receipts of grain, mostly wheat, in 1906 amounted to 60,483,500 bushels, and the

Kansas City

shipments to 43,214,500 bushels; shipments of flour, 1,386,600 barrels; receipts of live stock, 6,918,000 head (including 2,296,000 cattle, 260,000 calves, 2,676,000 hogs, 1,617,000 sheep, and 70,000 horses and mules), and shipments, 1,679,000 head (including 949,000 cattle, 100,000 calves, 92,000 hogs, 473,000 sheep, and 66,000 horses and mules). There are 11 banks in the city, including 3 National banks. The railroads entering the city include the Union Pacific, Missouri Pacific, Chicago Great Western, Mexico and Orient, and other lines.

History and Population.—The present city was chartered in 1886, when the former municipalities of Wyandotte (chartered 1857), Kansas City (chartered 1868), and Armourdale (chartered 1882) were consolidated. In August, 1902, a severe storm destroyed over 200 houses, besides injuring a large number of public and private buildings. Population, 1886, 21,299; 1890, 38,316; 1900, 51,418; 1910 (13th census) 82,331. In 1900 the population consisted of 26,690 males and 24,728 females, and included 6,509 negroes (12.7 per cent.) and 6,377 foreign born (12.4 per cent.). The most numerous elements among the latter were 1,655 Germans, 1,251 Irish, and 1,030 Scandinavians.

Kansas City, Missouri, lies at the extreme western line of the state, in the angle formed by the junction of the Kansas river with the Missouri, where the latter river makes its chief bend to the eastward on its way to the Mississippi. Next to St. Louis, it is the principal city of the State, and with its sister, Kansas City, Kansas, formerly Wyandotte, on the opposite bank of the Kansas river, is the great entrepôt and distributing centre for the widespread agricultural regions to the west and south.

History.—Kansas City is 235 miles west by north from St. Louis and its peculiarly advantageous location has from the first made it a favorite trading-post ever since the early years from 1765 to 1800 when the French trappers pushed up the Missouri river and hunted and bartered with the Indians for furs. Jackson county, in the northwest corner of which lies Kansas City, was also a hunting resort for other whites from the eastern part of the State, St. Louis having been founded as a trading-post in 1764. But after the purchase of the vast Louisiana Territory in 1803 the river lines of Missouri, then a part of that tract, were more rapidly opened up. In 1800 Louis Barthelot with his wife settled in the Kansas-Missouri river angle; in 1804 Lewis and Clark passed there on their great exploration, and gave interesting accounts of the region; and in 1821 the first permanent settlement was made by a company of French fur traders, under the lead of Francis Chouteau. This was practically the founding of Kansas City, but for years the inhabitants were almost exclusively French trappers, traders, river *voyageurs* and their families, whose principal interest was fur trade with the Indians. In 1825 some Americans came in; in 1838 the town was laid out on the flats between the high bluffs and the river, although it did not show much growth till 1846; and in 1853 it became a corporate city. For some years after 1840 the town enjoyed a fine trade by reason of being on the line connecting St. Louis with New Mexico by way of the Santa Fé Trail, as that famous wagon-road was called. But the first real stimulus it received was in 1865, when it was reached by the Missouri Pacific Railroad, and the era of its modern trade began.

From that time, its location at the confluence of two rivers draining a vast region rich in agricultural products and settled by a hardy race of workers, and its rapidly growing population, railroad connections, and unbounded spirit of enterprise, have borne it forward with amazing rapidity. From its feeble village community of 478 in 1855, it had grown to 4,418 in 1860, but after that its attractions multiplied its people by leaps. The supply of agricultural implements, and the other increasing needs of the grain and cattle country, and in return the grain, cattle and meat trade to the east, the extensive capital employed in these affairs, the growth also of milling, and of various kinds of manufacture that have come into operation in this twenty years past, which at present represent a product of more than forty million dollars yearly, engage the energies of a very busy and important center.

Features.—Kansas City is divided by its natural surface-form into three parts —the Hills, or the portion built on the bluffs which pass off east and south into a beautiful upland region; the East Bottom, the part built on the low lands between the bluffs and the Missouri river, east of where Grand Ave. comes through to the water; and West Kansas City, the low lying lands between the State line and the eastern bluffs of the Kansas river—for the State line runs straight north and south there and cuts off a part of the town that has followed the curves of the river bank. And a most important part of the city is that western segment, for in it are the great Kansas City stock yards, packing houses, and a large part of the terminals of the 33 railroad lines (operated by twenty different systems or companies, and representing over 50,000 miles of traffic). Both the lower and the higher parts of the city are well supplied with fine commercial buildings and handsome residences, and many public edifices of striking proportions show a liberal spirit. The city hall, the board of trade building, the New York and the New

England life insurance offices, the fine public library containing about 90,000 volumes, an art gallery and museum, some 30 hospitals, asylums and homes, 7 theaters, with the law school, medical colleges, training Schools, 52 public school buildings, 180 churches, above 600 manufactories, 3 great railroad bridges and others for ordinary traffic, together with the wide streets, the well kept homes, the 6 park districts (comprising altogether 2,098.9 acres) distributed in 19 parks and these connected by 15 boulevards, speedways, etc., combine to make an admirable example of what can be accomplished in a short time by a typical American community.

Statistics.—Some facts published in reports to the Board of Trade, Jan. 1, 1906, are of interest. There were received for the year 1905, 40,038,000 bushels of wheat; 21,508,000 bushels of corn; 6,667,500 bushels of oats; 323,000 bushels of rye; 856,000 bushels of barley—making a total of 69,392,500 bushels of grain—12,800 bushels flax-seed; 8,865 tons of bran, and 133,170 tons of hay. The total increase of grain receipts over the year 1904, was 10,541,600 bushels. To handle this grain there are 36 elevators with a capacity of 10,100,000 bushels. The mills of Kansas City for the year ending Dec. 31, 1905, manufactured 2,058,000 barrels of flour, and a corresponding output of corn and oatmeal.

In 1895, the bank deposits were $19,587,000, and in 1905, $89,951,599—the bank clearings being $1,197,905,556. The real estate transfers, $37,471,000; building operations, $10,947,020. The post office receipts, $1,400,826.64; money orders, $18,171,344.

As a large element in the prosperity of Kansas City is its live stock and meat packing business, a statement of the receipt of animals at the stock yards and private packers cannot be omitted. The number of cattle received was 2,289,044; calves, 242,091; hogs, 3,195,338; sheep, 1,335,353; horses and mules, 65,582, or a total of 7,128,555 head.

Municipality.—The government of the city is through a mayor with a biennial term, an upper legislative chamber of 14 aldermen elected at large with 4 year term, and a lower chamber of 14 councilmen from wards with 2 year term, together with the usual elective officers. Special heads of departments, like the chief of the fire department, engineer, superintendents of buildings and streets, the park commissioners, etc., are appointed by the mayor subject to confirmation by the upper house, while the board of police commissioners consists of the mayor and two citizens appointed by the governor of the State, and is practically a political body.

The six daily and eleven weekly journals keep the people well informed. The public schools are managed on an educational and not a political basis, and the public library is under control of the board of education, while there are some sixty other educational institutions in the city. On the whole, the citizens seem to take a pride and an active interest in their own public affairs, and the result is a healthful and prosperous city. It may afford some suggestion in connection with the recognised excellence of the common, manual labor and high schools, and the remarkable development of its park and boulevard system, to say that the board of education and the park board are each non-partisan,—men of high character, who serve without pay. Pop. (1890), 132,716; (1900), 163,752; (1910) 248,381.

R. T. Van Horn.

Kansas River, a large river, formed by the union of the Smoky Hill Fork and Solomon river, 10 miles W. of Abilene, and so called from the tribes of Indians which once dwelt on its shores. It flows E., joins the Missouri river between Wyandotte and Johnson county, on the E. border of Kansas, and traverses a fertile plain interspersed with heavily wooded hills and bluffs. Its chief affluents are Grand Saline Fork, Big and Little Blue and Republican Fork.

Kansas, University of, a coeducational non-sectarian institution in Lawrence, Kan.; chartered in 1864; opened in 1866; has grounds and buildings valued at over $1,100,000; endowment, $150,000; scientific apparatus, etc., $400,000; volumes in the library, over 65,000; ordinary income, about $450,000; average number of faculty, 175; students, about 2,500; graduates, over 3,700.

Kansas-Nebraska Bill, The, an act passed by Congress in 1854, during the administration of President Franklin Pierce, for the purpose of organizing the Territories of Kansas and Nebraska. It provided, among other things that the question of slavery should be left to the people; that questions involving the title to slaves were to be left to local courts, with the right to appeal to the United States Supreme Court; and that the fugitive slave laws were to apply to the Territories. Further, so far as this region was concerned, the Missouri Compromise of 1820, which excluded slavery from the Louisiana purchase N. of lat. 36° 30′ N., except from the State of Missouri, was declared repealed. This measure disrupted the Whig party, most of the S. Whigs joining the Democrats; led to the organization of the Republican party in 1856; and helped to bring about the Civil War.

Kansas Wesleyan University, a coeducational institution in Salina, Kan.: founded in 1886 under the auspices of the Methodist Episcopal Church; has endowment of $25,000; grounds and buildings valued at over $185,000; scientific apparatus, etc., $6,000;

volumes in the library, about 7,500; ordinary income, about $30,000; average faculty, 40; average students, about 1,400.

Kansoo, or **Kansu** (kän-sö′), an island province in the N. of China; area, 125,450 square miles; pop. 10,385,376. It is mountainous, some of the peaks rising more than 10,000 feet above sea-level, and is watered by the Yellow river, but has few fertile tracts. The climate is cold, but wheat, barley, and millet grow, and large flocks and herds are kept. Capital, Lan-choo-foo.

Kant, Immanuel (känt), a German philosopher; born in Königsberg, Prussia, April 22, 1724. His three great works were: "Critique of Pure Reason" (1781), which attempts to define the nature of those of our ideas which lie outside of experience, and to establish the basis of valid knowledge; "Critique of the Practical Reason" (1788), which bases the ideas of God, freedom, and immortality on the ethical consciousness

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alone, denying that we have any right to hold them otherwise; "Critique of the Power of Judgment" (1790). He wrote also on cosmic physics, æsthetics, pedagogy, ethics, the metaphysical basis of law, etc. He was Professor of Logic and Metaphysics at the University of Königsberg. He died in Königsberg, Feb. 12, 1804.

Kantemir, Prince Antiochus Dmitrievitch (kän′te-mēr), a Russian author; born in Constantinople, Sept. 21, 1709. His "Satires," in the antique form, written in rhyme and syllabic metre, were his most important work, and are valuable as describing Russian life and manners. Many of their verses became proverbs with the Russian peasantry. They were the first fruits of modern Russian literature. He may be called a father of secular writing in Russia. ("Words," 2 vols. St. Petersburg, 1867.) He died in Paris, April 11, 1744.

Kanuri (kä-nö′rē), or **Kanori,** a Sudanese people, who form the principal portion of the population of Bornu.

Kaolin, or **Kaolinite,** a mineral element found in granite, and generally arising from the decomposition of the feldspar. It is essentially a hydrated silicate of alumina. It occurs in many places in very extensive beds as an earthy powder, and is derived principally from the decomposition of the feldspars of granites, granitic, gneissic, and felsitic rocks. After being levigated it is extensively used in the manufacture of porcelain, and is hence called china clay.

Kapila (kap′i-la), the founder of the Sánkhya philosophy, one of the philosophical systems of the Hindus. He is usually reputed to have been a son of Brahmá; but he is otherwise described as an incarnation of Vishnu.

Kapp, Friedrich (käp), a German biographer and historian; born in Hamm, Westphalia, April 13, 1824. He left Germany at the outbreak of the revolution of 1848, finally wandering as far as New York (1850). He took active part in American politics. Returning to Germany in 1870, he entered the Reichstag in 1872. Nearly all his works refer to the United States, as "American Soldier Traffic by German Princes" (1864), "German Emigration to America" (1868), and his "Lives" of Kalb and Steuben. A citizen of two hemispheres, he was a pioneer in a style of literature that may be called international. He died in Berlin, Oct. 27, 1884.

Karadscha. See PHOCÆA.

Karachi (-rä′chē), a district of Sind, India, bounded on the W. by Baluchistan, on the S. by the Arabian sea, on the E. by the Indus; area 14,115 square miles; pop. about 480,000. Also a seaport and the chief city of Sind, on Karachi Bay; annexed by the British in 1843; foreign trade amounted in 1898-1899 to 12,896,636 tens of rupees; pop. (1891) 105,199.

Karadzic, Vuk Stefanovitch (kä-rä′-jitsh), a Servian author; born in Trshitch, Nov. 7, 1787. The two great works of his life were the reformation of the Servian literary language (which up to his time had been a very debased medium, being either rude Slavonian or a hybrid jumble of Serb and Slavonian), and the publication of the "Popular Serb Songs" (4 vols. 1814-1833; 3d ed. 1841-1846). His epoch-making "Dictionary" appeared in 1818. The songs attracted widespread attention and were translated into every European tongue. He was the founder of modern Servian literature. He died in Vienna, Feb. 7, 1864.

Karaites (kār′ā-īts), the descendants of the ancient Sadducees. Their system was revised by Anan ben David, A. D. 761 or 762, They reject tradition, and in this respect

bear the same relation to the Talmudic Jews that Protestants do to Roman Catholics. A few years ago they numbered about 5,000 or 6,000. They are found in Russia, Galicia, Constantinople, Jerusalem, etc.

Karak, or **Kharrack** (kä-räk′) (the Icarus of Arrian), an island of Asia, in the Persian Gulf, belonging to England, 35 miles N. W. of Bushire. Area 13 square miles. This island is of some importance as affording a secure anchorage for ships, and a station where they may water and refit. It has successively belonged to the Dutch, Arabs, Persians, and French. The English finally took possession of it during the war with Persia in 1839.

Karakorum (kä-rä-kō′rum) (1) a name given, but according to the best geographers erroneously, to the Muztagh range, in the W. Himalayas; sometimes also it is given, again erroneously, to the Kuen-Lun range on the N. of Tibet. The Mustagh or Muztagh range is that part of the Himalayas which lies to the W. of the Indus and extends as far as the head of the Gilgit valley. It embraces some of the loftiest peaks of the Himalayan system. (2) The name properly appropriate to a pass (18,550 feet), the culminating point of the route between India and East Turkestan. The old Mongolian capital, to the N. of the desert of Gobi, on the Orkhon, a tributary of the Selenga river; the ruins remain.

Karaman (kä-rä-män′), a town of Asiatic Turkey, in Karamania, 58 miles S. S. E. of Konieh. It is situated at the foot of a spur of Mount Taurus, and, though formerly a large place, is now unimportant. Manufactures cotton fabrics. Karaman was the capital of a Turkish kingdom which lasted from the time of the partition of the Seljuk dominions of Iconium till 1486, when Karamania was subjected by the Ottoman sultan, Bajazet II., from which time Konieh became the seat of the pashalic. Pop. about 7,000.

Karamania, or **Caramania** (-mä′nē-ä), a pashalic of Asiatic Turkey, having Mount Taurus on its S. boundary. Karamania forms the eyalet of Konieh, and is watered by the rivers Sihon and Kizil-Irmak. Chief towns Koniah and Karaman. See KONIAH.

Karamnasa, a river in the presidency of Bengal, British India; after a course of 146 miles, during which it forms for some distance the dividing line between Bengal and the Northwestern provinces, enters the Ganges. The Hindus hold it in the greatest abhorrence, and will neither drink nor touch its waters, though they are of crystal clearness and abound in fish.

Karamzin, Nikolai Mikhailovitch (kä-räm-zin′), a Russian historian; born in Mikhailovka, near Simbirsk, Dec. 12, 1765. He left the army to devote himself to literature. His great work, "History of Russia" (11 vols. 1816–1829), created a tremendous sensation, being read even by the court and fashionable ladies. "He appeared," in Pushkin's words, "to have discovered old Russia, as Columbus discovered America." The tone of the work was ultraconservative. Its style has been pronounced perfect, though today it seems over-rhetorical. It was translated into French and German. "Letters of a Russian Traveler" (1797–1801), in the style of Sterne, met with great favor. Of several novels, "Poor 'Lisa" was much imitated, and with others of his writings, translated into German by Richter. Karamzin was also a translator and journalist. With Lomenosov, he was the creator of Russian prose. ("Works," St. Petersburg, 1848.) He died near St. Petersburg, June 3, 1826.

Karankawan, a race of North American Indians which in the 17th century lived on the central coast of Texas. They were unusually tall and well built, and given to athletic sports, from which they were called Keles, or "wrestlers." They are now extinct.

Kara (kä′rä) **Sea,** the portion of the Arctic Ocean between Nova Zembla and the Yalmal Peninsula, off the Siberian coast. The Obi and Yenisei rivers discharge their waters into its N. E. corner. Since Nordenskjöld's famous voyage in the "Vega" (1875), various navigators have demonstrated the navigability of the sea. The Kara Sea being thus navigable for about two months (July to September) in the year, can be made available for trade with Siberia. Captain Hovgaard of the Danish navy urged in the "Scottish Geographical Magazine" (January, 1890) that this would be the most feasible route whereby to reach the North Pole.

Karasoutzas, John (kä-rä-sö′tzas), a Greek poet; born in Smyrna, July 9, 1824. His verse was not only patriotic, but strong and graceful. It appears in the collections "Lyrics" (1839); "Breath of the Morn" (1846); "Kleonike" (1868), a narrative poem, etc. He died April 3, 1873.

Karategin (kä-rä-tā-gēn′), a country of Central Asia, forming the E. province of Bokhara, and having the Russian province of Khokand on the N.; area 8,310 square miles. It is a highland region (6,000–7,000 feet), and is traversed from E. to W. by the Surkhab or Kizil-su, a tributary of the Amu-Daria. In winter (October to May) the climate is very severe; nevertheless much fruit and corn are grown. The people, Tajiks by race, number about 100,000, with about 5,000 nomad Kirghiz. The native khans claimed to be descended from one of Alexander's captains, and only lost their independence, to Bokhara, in 1868.

Karauli (ka-râ-lē′), a native State in Rajputana, India, separated by the Chambal river from Gwalior; area 1,208 square miles; pop. 156,587, nearly all Hindus. It is a hilly country, especially rich in timber. Capital Karauli, 75 miles N. W. of Gwalior, defended by a sandstone wall two miles in extent; pop. 25,607.

Karavelov, Liuben (kä-rä-vā′lof), a Bulgarian author; born in Koprivchtitsa, in 1834. He was one of the creators of Bulgarian prose. His works consisted of novels, tales, and poems (8 vols. 1887). He died in Rustchuk, Feb. 11, 1879.

Karavelov, Peter, a Bulgarian statesman; born in 1840. He received his early education at Moscow, and took his degree in the University of Dorpat, becoming subsequently teacher at the gymnasium of Philippopolis. At the outbreak of the Russo-Turkish War, Karavelov was appointed vice-governor of Widdin. He is considered the author of the constitution adopted at Tirnova. He became a member of all the ministries succeeding the first one, but in 1881 retired to Philippopolis, where he organized the National party. He exercised considerable influence over Aleko Pasha, and after Prince Alexander made him premier his authority in the Chamber became paramount, most of the laws adopted being devised by him. His motto was, "Bulgaria for the Bulgarians." Died Feb. 6, 1903.

Karelia (kär-ā-lē′ä), an old name for the S. E. part of Finland, annexed to Russia by Peter the Great in 1721. The Karelians properly so called are a branch of the Finnic race, about 303,000 in number, who dwell in the E. parts of Finland and the adjoining provinces of Russia from Archangel to Tver.

Karelinite (kar′e-lin-īt), oxide of bismuth, with formula BiO_3. Massive, with crystalline structure; hardness, 2.0; sp. gr., 6.6; color. lead-gray; luster metallic when cut. Is found at the Savodinsk mine, Altai Mountains, mixed with earthy sulphide of bismuth.

Karens (kä-renz′), a pagan tribe of Burma, formerly confined to a region beyond the Salween river, called Karen-ni, on the borders of Burma and Siam, but now distributed over various parts of Burma. They are an intelligent and industrious race, many of them having become Christianized, chiefly through the agency of American missionaries. They are estimated at about 100,000, but the Karen dialect is stated to be spoken by six times that number.

Karikal (kä-ri-käl′), the second in importance of the French possessions in India, on the Coromandel coast, 12 miles N. of Negapatam; area nearly 53 square miles; pop. (1904) est. 19,000. It is a fertile tract, well supplied with rivers and canals, and largely given up to the cultivation of rice. Capital, Karikal, about a mile from the sea; it has been four times taken by the British. There is an active trade in rice, principally with Ceylon and the Straits Settlements. The annual revenue is about $80,000. Pop. (1901) 13,783.

Karli, a Chaitya temple-cave in the Bombay presidency, British India, on the road between Bombay and Poona. In front stands a lion-pillar, supporting four lions, and bearing an inscription which ascribes its date to the 1st century B. C. The outer porch, 52 feet wide, is closed by the remains of a screen. The dimensions of the interior are 126 feet by 45 feet seven inches, the height being not over 45 feet. The building consists of "a nave and two side-aisles, terminating in an apse or semi-dome, round which the aisle is carried." All the pillars are octagonal, the seven behind the dagoba or tope being plain, but the 15 on either side of the nave having richly ornamented capitals bearing elephants and human figures, all admirably executed. Over the entrance is one great window in the form of a horseshoe directing the light mainly on the dagoba.

Karlovo, a town in Eastern Rumelia, 30 miles N. of Philippopolis, at the foot of the highest peak of the Balkan Mountains; has manufactures of lace and cloth; about 100 years old; in 1877, after a determined resistance, it was taken and pillaged by Suleiman Pasha; pop. 9,000.

Karlsbad. See CARLSBAD.

Karlsruhe. See CARLSRUHE.

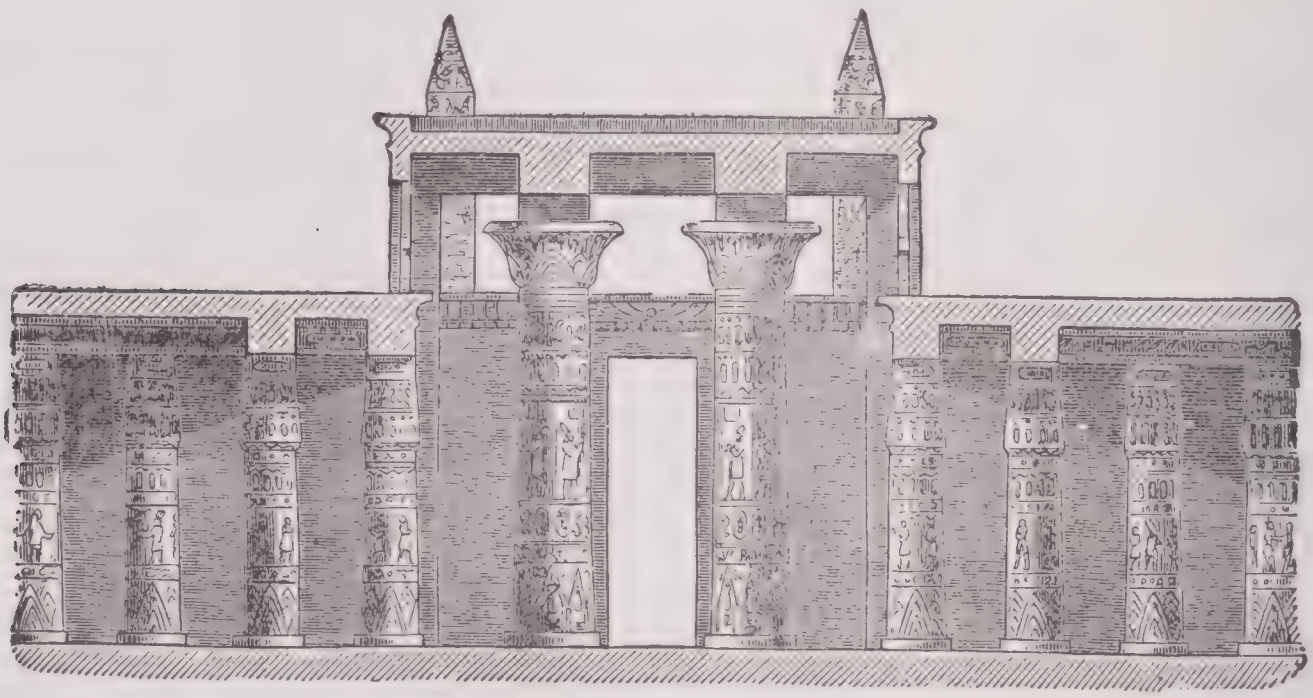
Karma, in Buddhism, the accumulation of merit or demerit which remains when an individual existence has come to an end. It is the summing up of the actions of the life that has just ceased, and of all the previous lives in the same series, and determines the nature, condition, locality, and future of a new sentient being into which it passes.

Karmanshah. See KERMANSHAH.

Karmathians, a religious and communistic sect into which the Ismaîlîs developed in Asia under the head of Hamdan Karmat, a peasant-prophet in the region of Kufa. The secret society soon organized itself and began a formidable peasant war. Damascus had to ransom itself; Baalbec was taken and its inhabitants put to the sword. Abu Taher in 923 took and plundered Bassora; next year he plundered a caravan of 20,000 pilgrims returning from Mecca; and in 925 captured and plundered Kufa, killing or enslaving the inhabitants. In 930 during the Hajj he took Mecca, killing 30,000 persons, choked the well Zem Zem with corpses, and carried away the black stone. Then he threatened Bagdad with only 500 horse from among his 107,000 armed zealots. During the next eight years there was no Hajj, but

it was resumed on a payment of 25,000 dinars by the calif to Abu Taher. After a 22 years' absence the black stone was brought back to Mecca by the Karmathians and ransomed. During the next 100 years the sect gradually succumbed to the sword and to natural causes, but not till it had acted as a powerful dissolvent on the califate.

Karnak (kär'nak), a village in Egypt built on the site of Thebes, on the bank of the Nile, and renowned for its magnificent architectural antiquities. The principal one of these is the Great Temple, 1,200 feet long and 330 feet wide. In this are found great colonnades, obelisks, and a vast quantity of sculptures. Various colored marbles, sandstones and granite are used. Other smaller temples abound, beautifully ornamented with mural decorations which portray the kings, divinities and recreations of those ancient peoples. These temples were erected at various times from 1500 B. C. to 28 B. C.



TEMPLE OF KARNAK.

Karnovitch, Evgenij Petrovitch (kär-nō'vich), a Russian historian; born near Jaroslav, Oct. 22, 1823. His historical work, "Russia's Part in the Deliverance of the Christians from Turkey's Yoke," "Konstantin Pavlovitch," etc., was important. "Great Fortunes in Russia" (1885) contained interesting facts. His best-known novel is "Love and Crown"; it has been translated into several European languages.

Karnul (kur-nöl'), a town in Madras presidency, British India, 110 miles S. by W. from Haidarabad. Fever is epidemic. Pop. about 20,000. The district is separated on the N. by the Krishna from the Nizam's dominions; area 7,788 square miles; pop. about 710,000. The canal of the Madras Irrigation Company traverses it for 140 miles. Karnul suffered very severely during the famine of 1877–1878.

Karolyi (kä-rōl'yē), **Count Aloys de Nagy,** an Austrian statesman; born in 1825. He assisted Prince Schwarzenberg in his vindication of Austria's influence in 1849, and later he filled various diplomatic posts at Hanover, Berne, Rome, Athens, London, Copenhagen, and St. Petersburg. His tried skill caused him to be sent to Zurich in 1859, where he concluded peace with Italy and France after the unfortunate campaign which ended at Solferino. Toward the end of 1859 he went to Berlin as ambassador, where he remained till the Austro-Prussian rupture. Before leaving Berlin he was near enough to help Bismarck when attacked by an assassin in the street. He returned to Berlin as ambassador Dec. 22, 1871, and soon took rank as one of the most distinguished and experienced diplomatists there. In Feb., 1879, he was sent to England as ambassador. He was one of the members of the Berlin Congress, and was a Knight of the Black Eagle. He died in 1889.

Karoo, or **Karroo** (ka-rö'), the middle terrace in point of elevation in the South African tableland, constituting part of the Cape Region. It is very rich in vegetation, which, however, is mostly confined to one month — August. There are *Ericaceæ*, *Proteaceæ*, *Euphorbiaceæ*, *Liliaceæ*, *Iridaceæ*, the rhinoceros bush everywhere on the land, and *Prionium*, a rush, impeding the water courses.

Karpathian Mountains. See CARPATHIAN MOUNTAINS.

Karpinskí, Franciszek (kär-pin'skē), a Polish poet; born in Hotoscow, Galicia, in 1741. He was one of the illustrious figures at the court of Stanislaus Augustus for a time, but withdrew to his estates in 1793 and engaged in philanthropic work. His poems (1804) are remarkable for energy,

simplicity, and patriotism, and still retain a hold on the people. He died in Lithuania, Sept. 4, 1825.

Karr, Alphonse (kär), a French writer; born in Paris, Nov. 24, 1808. He was educated at the College Bourbon, and early devoted himself to journalism. Among his numerous striking novels were "The Shortest Way" (1836); "Genevieve" (1838); "Clotilde" (1839). "A Journey around my Garden" (1846), talks on botany and natural history, was in another vein. "Woman" (1853) was a study of morals. Two dramas, "The Norman Penelope" (1860) and "Yellow Roses" (1866), were not very successful. One of his most characteristic efforts was the series of papers called "Les Guêpes." They were confidential, anecdotic, critical, witty, satirical, caustic, in fact well-nigh unique; and were the cause of an attempt being made on his life (1844) by an offended woman author whom they had harshly criticized. In 1855 went to live at Nice, where he occupied himself with gardening. He died in St. Raphael, Var, Sept. 29, 1890. His daughter, THÉRÈSE KARR (born 1835), published tales and historical books.

Karri, a valuable timber largely exported from Western Australia, and obtained from an enormous tree belonging to the eucalyptus family.

Kars (kärs), a fortress town of Russian Armenia, 110 miles N. E. of Erzerum. It is on a tableland of upward of 6,000 feet in elevation; the climate is therefore rather severe. Pop. of town, since the Turks and Lazes migrated to Turkey, 21,000, mostly Armenians, who carry on an active transit trade. In 1828 Kars was taken from the Turks by the Russians under Paskevitch. It was brilliantly defended by the Turks under General Williams for six months in 1855. At the beginning of the war of 1877–1878 Kars was invested by the Russians; but relieved in July by Mukhtar Pasha; besieged again in the autumn, it was carried by storm Nov. 18, 1877, by General Lazareff. Kars, long a bulwark of the Ottoman empire in Asia, was one of the Armenian fortresses, the cession of which to Russia was agreed to by the Berlin Congress in 1878. It forms now a commanding position from a military point of view on the plateau of Asia Minor, facilitating future aggression toward Erzerum and Turkish Armenia in general. Kars, whose fortifications have been augmented, is nearly impregnable.

Karshi (ancient Nakhsheb), a town of Bokhara, Central Asia, situated on a plain 95 miles S. E. of Bokhara city and 80 S. W. of Samarcand. It is surrounded by well-cultivated land and numerous gardens. Commercially it is of great importance in the transit trade between Bokhara, Kabul, and India. Its knives and firearms are exported to all parts of Central Asia, Persia, Arabia, and Turkey. Pop. about 25,000, mostly Usbegs, with a mixture of Tajiks, Indians, Afghans, and Jews.

Karst, The, a desolate limestone plateau in Austria, at the base of Istria. It is noted for its subterranean streams, its rocks, caves, and fertile pits, the latter both small, and large enough to contain groves, forests, and temporary lakes formed by the rainfall. The famous Adelsberg grotto is here.

Karttikeya (kär-ti-kā′ya), the Hindu Mars or war-god, and commander-in-chief of the celestial armies. He slew Târaka, the demon king whose power threatened the very existence of the gods.

Karuizawa (kä-rö-ē-zä′wä), a village of Shinano, Japan, about 100 miles N. of Tokyo; 3,200 feet above sea-level; a favorite summer resort for foreigners.

Kárún (kä-rön′) **River,** the Ulai of Dan. viii: 2, the sole navigable river of Persia, rising in the Zardah Koh Mountains, near Ispahan, and flowing W. through gorges of the Bakhtiári range to Shuster, the capital of the province of Arábistán, where it becomes navigable. At Ahwáz a reach of rapids and broken water bars the course of vessels to the Lower Kárún, and a canal from Ahwáz to a point about 1½ miles down stream will have to be cut before through navigation is possible. A tramway was in 1890 in course of construction for the conveyance of passengers and merchandise from the limit of navigable water to Ahwáz.

Kasanlik, a town of Eastern Rumelia, at the foot of the Balkans, five miles from the S. end of the Shipka Pass, and 87 miles N. W. of Adrianople. It manufactures otto of roses. Its capture by the Russians Jan. 7, 1878, led to the surrender of the Turkish defenders of the Shipka Pass. Pop. about 20,000.

Kaschau (kä′shou), one of the oldest and handsomest towns of Hungary; in the valley of the Hernad, surrounded by vine-clad mountains, 130 miles N. E. of Budapest. The cathedral of St. Elizabeth (built 1270–1468) is the finest Gothic edifice in Hungary. The town, which ranks as the provincial capital of Northern Hungary, is the seat of a Roman Catholic bishop, has various schools, an agricultural institute, and a royal tobacco factory; stoneware, furniture, starch, nails, and paper are also manufactured. Kaschau is celebrated for its hams. Of the Jesuit university founded here in 1659 all that now remains is the law academy. Kaschau figured prominently during the Hungarian revolution of 1848. Pop. (1900) 40,102.

Kashan (kä-shän′), one of the most flourishing towns of Persia; in a well-peopled, well-cultivated district; 3,690 feet above sea-level, and 92 miles N. of Ispahan. The vicinity is celebrated for its fruit, particularly melons and pears, and the town for its extensive manufactures of silk-stuffs, gold brocade, glazed tiles (called all over Mohammedan Asia *kashi*), carpets, and copper-wares. It abounds, like all Persian towns, in mosques, bazars, and baths. Pop. 30,000.

Kashgar, the capital of Eastern Turkestan, Chinese empire; on a fertile and well-watered plain, 4,043 feet above sea-level; between the old city and the new (1838, containing the palace of the Chinese governor of Eastern Turkestan). It is important commercially and strategically; in 1759 it was conquered by the Chinese, who held it with short intervals till 1863, when Yakub Beg made it his capital, the Chinese again obtaining possession of it in 1877. Pop. 60,000 to 70,000.

Kashkar, a large species of sheep inhabiting the lofty plateaus of Central Asia. The male has very large horns bent circularly, while the female has horns resembling those of a goat.

Kashmir, or **Cashmere,** an extensive principality in the N. W. of Hindustan, subject to a ruler (the Maharajah) belonging to the Sikh race. The principality embraces not only Kashmir proper, but also Jammu or Jummoo, Baltistan or Little Tibet, Ladakh, Gilghit, etc; area, estimated 80,000 square miles; pop. (1901) 2,906,173, of whom 1,793,710 were Mohammedans and 691,800 Hindus. Kashmir extends from about lat. 32° to 37° N., and from about lon. 73° to 80° E., and is largely a region of mountains, containing magnificent glaciers. The Kuenlun range bounds it on the N., one peak of which rises to the height of 28,265 feet. The country is watered by the Upper Indus and its tributaries, and by the Jhelum and Chenab. Kashmir proper, which forms a small portion of the whole, is a valley surrounded by gigantic mountains, the Himalaya and Hindu Kush, and traversed by the river Jhelum (formerly Hydaspes). There are 10 chief passes through the mountains into this valley varying in height from about 9,000 to 12,000 feet. The elevated situation of the valley, and the mountains of snow which surround it, render the climate rather cold; but the region is well watered by streams and very fertile. Forests on the slopes, fields of corn, rice crops along the sides of the rivers, rich orchards, and an abundant growth of flowers distinguish the district, but the fruits of warm climates do not ripen here. Among its minerals are iron and plumbago. Sulphur springs are common. Earthquakes frequently occur, and in 1885 one caused the loss of thousands of lives. Bears, leopards, wolves, the ibex, and chamois are among the animals. The flora has a strong affinity to that of Europe; the deodar cedar forms extensive and valuable forests. The common European fruits are grown, and attention is now being paid to the culture of the vine. The chief crops are wheat, barley, rice, and Indian corn, and two harvests are reaped in the year.

The chief manufacture is that of the celebrated Kashmir shawls, but it is not so extensive as it once was, since manufactories have been established at Amritsar in the Punjab, and elsewhere. The genuine Kashmir shawls owe their superiority to the material of which they are made, which is, properly speaking, not wool, but a fine kind of down with which the animals of this region are clad during the winter season, and which in length and fineness far surpasses the merino wool. This down is obtained in great quantities from the Kashmir goat, the yak of Tibet, and the wild sheep. It is spun by women and girls, and then passes into the hands of the dyers. From the dyers the yarns are passed to the weaver, and the shawl is woven in strips, which are afterward very skillfully sewed together. The average time taken to manufacture a good Kashmir shawl is from 16 to 20 weeks. The inhabitants of Kashmir are a fine race physically, tall, strong, and well-built, with regular features. There are 13 separate dialects in use. The Maharajah is independent, but his relations with other states are subject to the authority of the government of India. The capital of the whole principality is Jammu. Srinagar (or Kashmir) is the Maharajah's summer residence and largest town. The total revenue is estimated at $4,000,000, chiefly from land. The government revenue is paid in kind, and the grain claimed by the state is stored in public granaries and sold at fixed prices.

Kashmir, or **Cashmere Goat,** a variety of the common goat remarkable for its fine downy fleece, said to be found in perfection only in Tibet in the neighborhood of Lhassa, but also found in other parts of this region, including Ladakh, now a province of Kashmir. The colder the region where the goat pastures, the heavier is its fleece. A full-grown goat yields not more than eight ounces, the fine curled wool being close to the skin. A large shawl of the finest quality requires five pounds of the wool; one of the inferior quality from three to four pounds.

Kashoubish, a Slavonic dialect spoken by 200,000 persons near Danzig. It has been debated whether it should be regarded as a dialect of Polish, or as a form of the extinct Polabian.

Kaskaskia (-kas′-), a river of Illinois, rising in the E. center of the State, flowing S. W., and entering the Mississippi at Chester; length, nearly 300 miles. On its right bank, a few miles from the mouth, is the city of Kaskaskia, the first capital of Illinois Territory.

Kaskaskia, Fort, an ancient and Revolutionary fort on the site of the present city of Kaskaskia, Ill.

Kassai (kä-sī′), a river of Central Africa, a tributary of the Kongo, which it joins on the S. bank a few miles above Stanley Pool; has 800 miles of unbroken steam navigation, and pours into the Kongo with a stream of 5 miles an hour, 2 miles wide and no soundings at 120 feet deep. It was explored by Dr. Wolf in 1885–1886.

Kassala, a fortified town, formerly the capital of the Nubian district of Taka, on a tributary of the Atbara, 260 miles S. of Suakim. It was formerly the most important commercial center between the Nile and Abyssinia, and previous to the Mandi's rise had a population variously stated at from 8,000 to 20,000.

Kassel. See CASSEL.

Kasson, John Adams, an American diplomatist; born in Charlotte, Vt., Jan. 11, 1822; was graduated at the University of Vermont in 1842; settled in Iowa and practised law; member of Congress in 1863–1867, 1873–1877, and 1881–1884; United States minister to Austria in 1877–1881 and to Germany in 1884–1885; appointed United States special commissioner plenipotentiary to negotiate reciprocity treaties in 1897; and member of the Joint High Commission on American-Canadian affairs in 1898. He is the author of "History of the Monroe Doctrine" (1881);"History of the Formation of the United States Constitution"; (1889); etc. He died May 18, 1910.

Kastamuni (käs-tä-mö′nuh), capital of the vilayet of Kastamuni (area, 19,184 square miles; pop. 1,018,900), in Asia Minor, 76 miles S. W. of Sinope. Manufactures cotton goods, leather, etc.; copper-wares, for which the town was once celebrated, are no longer made. Here is the ancestral castle of the Comneni; the word "Kastamuni" is said to be a corruption of "Castra Comneni." Pop. about 40,000.

Katahdin (-tä′-), the highest mountain in Maine, about 80 miles N. by W. of Bangor, and 6 miles N. E. of Penobscot river. It is situated in a region difficult of access except by birch canoes, the river being the only thoroughfare through this rough territory, and its course being interrupted by frequent shoals and falls. Altitude, 5,200 feet.

Katahdin, The, a twin-screw, steel, harbor-defense ram of the United States navy; 2,155 tons displacement; length 250 feet 9 inches; breadth, 43 feet 5 inches; mean draft, 15 feet; horse power, 4,800; armor, 6 inches thick; batteries, four 6-pounder rapid-fire guns; speed 17 knots an hour; crew, 30 officers and 91 men; cost $930,000.

Kate, Jan Jakob Lodewijk ten (käte), a Dutch poet; born in The Hague, Dec. 23, 1819. "De Schepping" (The Creation, 1866) ranks as his best poem. In the form of a vision of Moses from Mt. Sinai it describes the creation of heaven and earth in seven songs, each beginning with the words of the Bible, then narrating the day's creation just finished, and ending with a hymn. His two next best poems are "The Planets" and "The New Church in Amsterdam." ("Works," 12 vols. 1889–1893.) He died in Amsterdam, Dec. 25, 1889.

Kate Hunnibee. See LYMAN, LAURA E. B.

Kater, Henry, an English physicist; born in Bristol, England, April 16, 1777. Entering the army in 1794, he went to India, and was actively engaged in the great trigonometrical survey; returned to England in 1808; then, after laboring for six years in the Royal Military College, Sandhurst, retired on half-pay. His contributions to science are chiefly to be found in the "Philosophical Transactions," 1813–1832. The most important of his memoirs relate to the determination of the length of the seconds pendulum at the latitude of London; the floating collimator, an instrument for aiding the determination of the horizontal or zenith points, for which invention he received the gold medal of the Royal Astronomical Society; the British standards of length and mass; and compass needles. With Dr. Lardner, he was the author of "A Treatise on Mechanics" in the "Cabinet Cyclopædia." For the Emperor of Russia he verified the Russian standards of length. He died in London, England, April 26, 1835.

Kater's Pendulum, a contrivance for measuring the force of gravity, named from its inventor Henry Kater. The principal governing its action is the fact that in the case of a physical (compound) pendulum the centers of oscillation and of suspension are interchangeable. It is a bar pendulum with two sets of knife-edges, symmetrical in form, but not in the distribution of masses with reference to the geometrical center; and, somewhat modified and improved, is now the standard for geodetic work. See KATER, HENRY.

Kathay. See CATHAY.

Kathiawar (kä-tē-ä-wär′), a peninsula on the W. coast of India, between the Gulf of Cambay and the Gulf of Cutch; the Brahman and native name for it is Surashtra.

Politically, the name Kathiawar Agency (formed in 1822) is given to a collection of 187 states, some independent, some tributary to native princes, and some (105) tributary to the British government in India, which between them embrace the greater part of the Kathiawar Peninsula. Area of agency, 20,559 square miles; pop. (1891) 2,752,404. The States of the agency supply one-sixth of the total quantity of cotton exported from Bombay.

Katkoff, Michael Nikiforovitch (kät-kof′), a Russian journalist; born in Moscow, in 1818. He studied at the universities of Moscow, Königsburg, and Berlin, and for some time filled the chair of Philosophy at Moscow; in 1861 became editor of the Moscow "Gazette," the organ of the university, and eventually made it the most influential journal in Russia. He was "the apostle of national Russian ideas" in politics, and acquired an influence in the government equal to, if not greater than, that of the ministers (except the chancellor), and is said to have been mainly instrumental in determining Alexander III. to his conservative and reactionary policy. As the champion of the idea "Russia for the Russians," Katkoff urged the complete Russification, by force if need be, of Poland and Lithuania, and of the Baltic provinces. He enjoyed an immense popularity as the representative of Russian Chauvinism. He died in Snamensky, near Moscow, Aug. 1, 1887.

Katmandu, the capital of Nepal, stretching for about a mile N. from the confluence of the Baghmati and Vishnumati rivers. It contains a great number of temples, many in pagoda shape, with roofs of brass, and others domed; but the houses are in general mean, the court-yards filled with rubbish heaps, and the streets are narrow and filthy in the extreme. The principal building is the immense ugly palace of the Maharaja; close to its modern *durbár*, or reception room, is the large military council chamber, the Kót, where in 1846 most of the chief men of the state were massacred.

Katona, Isturam, the historian of Hungary; born Dec. 15, 1732. At the age of 18 he entered the Society of Jesus, and subsequently held several professorships at the University of Buda. His most important work, and one of the highest authority, is his "History of Hungary" from the earliest times down to the year 1801. It is written in Latin and fills 41 volumes. He wrote also a summary of the history, and some other works. He died Aug. 17, 1811.

Katona, Joseph, a Hungarian poet; born in Kecskemet, Nov. 11, 1792. He wrote "Bánk-Bán" (1821), the grandest tragedy Hungary has produced. Long unnoticed, it appeared on the stage only in 1834, when it met with success, but did not become generally famous till 1845. Meanwhile its author, embittered by its failure, had renounced poetry, and died, beloved by the people, especially the poor. He died in Kecskemet, Nov. 2, 1830.

Katrine, Loch, one of the most celebrated of Scotch lakes, in Stirling and Perthshires, 5 miles E. of Loch Lomond and 9½ W. of Callander. Lying 364 feet above sea-level, it curves 8 miles E. S. E., is nowhere quite a mile broad, and has a maximum depth of 468 feet, and an area of 3,119 acres. It discharges through Lochs Achray and Vennachar, to the Teith; and since 1859 has supplied Glasgow with water. Huge Benvenue (2,393 feet) and Ben A'an (1,500) rise steeply at its lower end, whose shores are beautifully wooded, with the mountain defile of the Trossachs beyond. Here, too, are the "Silver Strand" and Ellen's Isle,

ROUND WINGED KATYDID.

the chief scene of the "Lady of the Lake." Scott was often here during 1790–1809, as also was Wordsworth with his sister Dorothy in 1805.

Kat River, a branch of the great Fish river, in Cape Colony, South Africa, rising in the Didimaberg, in the fertile valley of which a Hottentot settlement was formed in 1829. It was broken up after the rebellion of 1851–1852, and the valley now forms the district of Stockenstrom (after Captain Stockenstrom); area, 240 square miles; pop. about 7,000.

Kattegat. See CATTEGAT.

Kattimundoo, or **Kattimundu,** the milky juice of the plant *Euphorbia kattimundoo* or *Cattimandoo*, a small tree, with five-angled stems, a native of the East Indies. It resembles caoutchouc, and is used as a cement for metal, knife-handles, etc.

Katunski (kä-tön′ski), or **Katun, Alps,** the highest range of the Altai Mountains; in Tomsk, Siberia.

Katydid, a name applied to numerous American insects, nearly related to grass-

hoppers. They are arboreal in habit, and are well concealed in the foliage by their green color. The true katydid, abundant in the Central and Western States, is *Cyrtophyllus concavus*, but *Microcentrum retinervis* is yet commoner, and there are several other species belonging to these and other genera. In their general habit, *e. g.* in the "song" to which the syllables kat-y-did refer, and in the egg-laying accomplished by the long ovipositors of the females, these lively insects resemble the grasshopper.

Katzbach (käts'bä*h*), a river of Prussia, in Silesia, rising at Katzchdorf, and falling into the Oder 30 miles N. W. of Breslau; length, 34 miles. On the banks of that river, Aug. 26, 1813, the French were defeated by Blücher.

Kauai (kä-ö-ä'ē), a fertile island, of volcanic origin, belonging to Hawaii; area 590 square miles; pop., with Nühan (1910) 23,-952. Its highest point is 5,000 feet; principal industry sugar-planting. Captain Cook landed at the mouth of the Waumea river in 1778. There are interesting lava caves at Haeua Point; and Wailua Falls and the Valley of Kalihiwai draw visitors. Principal towns Lihue, Haualei, Koloa and Nawiiiwili.

Kaufmann, Alexander (kouf'män), a German poet; born in Bonn, May 14, 1817. Popular among his lyrics have been "The Bride," "About Midnight," "Morning"; of his ballads, "King Wenzel," "The Stolen Steed," "Lifthilde." His songs were simple, hearty and fervent — droll and dreamy, humorous and playful. Of several volumes of verse, the best was "Under the Vines" (1815). He died in Wertheim, May 1, 1893.

Kaufmann, Maria Angelica, a Swiss artist; born in Coire, Grisons, Switzerland, Oct. 30, 1741. She acquired the first principles of drawing and painting from her father, whom she soon excelled. At Milan, Florence, Rome, and Naples she increased her skill, and when, in 1766, she came to England, she was patronized by royalty, and her reputation and success quickly increased. In 1768 she became one of the first members of the Royal Academy. She remained in England 17 years and married Zucchi, a Venetian painter. Many of her paintings were engraved by Bartolozzi, but her reputation, not resting on any solid basis of excellence in art, has passed away. She died in Rome, Nov. 5, 1807.

MARIA A. KAUFMANN.

Kaufmann, Constantine von, a Russian general of German descent; born near Ivangorod, Russian Poland, May 3, 1818. He entered the army as lieutenant of engineers in 1838, fought against the Circassians in the Caucasus, and especially distinguished himself at the siege of Kars in 1855. In 1867 he was appointed governor-general of Turkestan, and at once set himself to organize this province, then newly conquered; in 1868 he occupied Samarcand, and in 1873 conducted a successful campaign against Khiva. Through his energetic policy Russia became the predominating power in Central Asia. He died in Tashkend, May 16, 1882.

Kaufmann, Mathilde. See GEORGE, AMARA.

Kaukauna, a city in Outagamie co., Wis.; on the Fox river and the Chicago and Northwestern railroad; 7 miles from Appleton, the county-seat. It has exceptional water power; is connected with all important points on the Great Lakes by steamers; and is chiefly engaged in the manufacture of paper and pulp. Pop. (1890) 4,667; (1900) 5,115.

Kaulbach, Wilhelm von (koul'ba*h*), a German painter; born in Arolsen, Waldeck, Oct. 15, 1805. He studied at Düsseldorf under Cornelius, whom he assisted in the execution of the frescoes of the Glyptothek at Munich, and subsequently succeeded in the Munich Academy. The desire of King Ludwig of Bavaria to make Munich the center of German art afforded free scope for his genius, and he was long engaged in the decoration of the Hofgarten, the Odeon, the palaces of Maximilian and Ludwig, and the new Pinacothek, for which he did the series of designs of contemporary groups of artists, architects, etc., executed in fresco on the exterior. His most ambitious pictures, with the exception of the Madhouse (1828), are to be found in a series (utilized in the decoration of the Berlin Museum) seeking to depict the progress of the human race in typical scenes from the great historic periods, and comprising the "Tower of Babel," "Age of Homer," "Destruction of Jerusalem," "Battle of the Huns and Romans," the "Crusades," and the "Reformation" (1834–1863). Besides these, however, he left a large number of portraits, designs, and illustrations of books, including the "Reineke Fuchs," the "Gospels," and the works of Shakespeare, Goethe, and Schiller. He died in Munich, April 7, 1874.

Kaunitz (kou'nits), **Prince Wenzel Anton von, Count of Rietberg,** an Austrian statesman; born in Vienna, Feb. 2, 1711. While minister to France (1750–1752), he succeeded in making an alliance between that country and Austria. From 1753 to 1792 he was state chancellor and chief minister and formed the coalition against Frederick the Great in 1756. He died June 27, 1794.

Kauri (kou'ri) **Pine,** or **Kowrie** (*Dammara australis*), a species of dammar, a native of New Zealand. It is a tree of great size and beauty, attaining a height of 140 feet or more, with whorls of branches, the lower of which die off as it becomes old. The timber is white, close-grained, durable, flexible, and very valuable for masts, yards, and planks. The Fiji Islands, New Hebrides, and Australia produce other species. All of them are trees of dark, dense, foliage, and produce a resin called Kauri resin, or Kauri gum, and sometimes Australian copal and Australian dammar, of which large quantities are exported from Auckland. It is sometimes found in pieces as large as a child's head, of a dull amber color, where forests of these trees have formerly grown; and is now known to lie mingled with coal strata of Tertiary age. It is also collected from the trees from which it has newly exuded, and is then of a whitish color. *D. orientalis*, a native of the Moluccas, exudes a similar resin, which is at first white like crystal, and is called white dammar, but with age it assumes a yellow amber tint.

Kautz, Albert, an American naval officer; born in Georgetown, O., Jan. 29, 1839; was graduated at the United States Naval Academy in 1859; prisoner in North Carolina and Richmond, Va., June–October, 1861; flag-lieutenant to Farragut in 1862. When New Orleans was surrendered he entered the city and raised the National flag over the custom house; promoted lieutenant-commander in 1865; commander in 1872; captain in 1885; commodore in 1897; and rear-admiral in 1898; and in the latter year was given command of the Pacific station. In March, 1899, while commanding the "Philadelphia" he took a prominent part in settling the Samoan troubles. After holding a meeting of all the consuls and the senior officers of the English and German war vessels in the harbor on board his ship, he issued a proclamation declaring that the provisional government under Mataafa was not in accord with the terms of the Berlin treaty. The German consul, however, advised the natives to resist the demands, and this resulted in hostilities, in which several American and British officers were killed and others wounded, while the natives lost heavily before order was restored. Admiral Kautz was retired in January, 1901. He died Feb. 6, 1907.

Kautz, August Valentine, an American military officer; born in Ispringen, Germany, Jan. 5, 1828; brother of Admiral Kautz. His parents settled in Ohio in 1832. He was graduated at the United States Military Academy in 1852; served through the Civil War; promoted captain in 1861; distinguished himself at Monticello, Ky., at Petersburg, Va., in the engagement on the Darbytown road in Virginia, in the capture of John Morgan, the Confederate raider, and in the Richmond campaign; promoted colonel in 1874 and Brigadier-General in 1891. His publications include "The Company Clerk" (1863); "Customs of Service for Non-Commissioned Officers and Soldiers" (1864); and "Customs of Service for Officers" (1866). He died in Seattle, Wash., Sept. 4, 1895.

Kava-Kava, Ava-Ava, or **Kawa,** a small shrub, about six feet high, with stems 1 to 1½ inches thick, native of the South Sea islands; sometimes called *Piper methysticum*. The rhizome is said to be valuable medicinally for certain diseases of the genito-urinary organs.

Kavanagh, Julia, a British novelist; born in Thurles, County Tipperary, Ireland, Jan. 7, 1824; the daughter of Morgan Kavanagh, an accomplished Irishman, author of various philological works; grew up a girl of remarkable beauty. Great part of her youth was spent in Normandy, her later life in Paris, Rouen, or Nice. She wrote "Madeleine, a Tale of Auvergne" (1848); "Nathalie" (1850); "Woman in France During the Eighteenth Century" (1850); "Women of Christianity" (1852); "Daisy Burns" (1853); "Adele" (1857); "A Summer and Winter in the Two Sicilies" (1858); "French Women of Letters" (1862); "English Women of Letters" (1863); "Queen Mab" (1863); "Beatrice" (1865); "Silvia" (1870); "John Dorrien" (1875); "The Pearl Fountain" (1876); etc. She died in Nice. Oct. 28, 1877.

Kaveri (kâ've-ri), a river of Southern India, rising in the Western Ghâts, and flowing S. E. across Mysore and Madras, to the Bay of Bengal, which it enters through two principal mouths; length, about 475 miles; drainage, about 28,000 square miles; flood discharge above the delta, 472,000 feet per second. The Kaveri is of no value for navigation, its bed being rocky, with numerous rapids and falls — as those at the island of Sivasamudram, in Mysore, famous for their romantic beauty. Other islands formed by this river are Seringapatam, in Mysore, and Sriringam, just above the delta. It is of importance for irrigation in Mysore

and in Coimbatore district, but especially in the marvelously fertile delta. For this purpose the main stream has been dammed since the 4th century A. D., the Coleroon (the N. branch) since 1838.

Kavi, or **Kawi** (kä′vē), the ancient sacred language of Java, with a vocabulary based chiefly on Sanskrit. The only place where it in any degree exists today uncorrupted by the ordinary Javanese, is the island of Bali, where its literature and the religion taught by it took refuge in the 15th century, on being driven from Java.

Kay, John, an English inventor; born near Bury, Lancashire, England, July 16, 1704. In 1733 he invented the fly-shuttle and in 1745 a power loom for the weaving of narrow goods. These inventions excited the anger of the working classes who found that the machines would entirely supersede hand labor, and they stole the machines, wrecked the home of the unfortunate inventor and obliged him to flee to France, where he died in destitution about 1764.

Kay, John, a Scotch caricaturist; born near Dalkeith, Scotland, in 1742. From an early age he practised prosperously as a barber in Edinburgh, till in 1785 he opened a print-shop for the sale of miniatures and sketches of local celebrities etched by himself. Kay's portraits form a unique and invaluable record of the social life of the Edinburgh of his time. They were collected and published as "A Series of Original Portraits and Caricature Eetchings by the late John Kay, with Biographical Sketches and Illustrative Anecdotes" (1838; new edition, with additional plates, 2 vols. 1877). He died in Edinburgh, Feb. 21, 1826.

Kaye, John. See CAIUS.

Kaye, Sir John William, an English historian; born in 1814. He was for a number of years an officer in the Bengal artillery, but resigned in 1841, and in 1856 entered the East India Company. On the transfer of the government of India to the crown, he succeeded John Stuart Mill in the political department of the India office. His works consist of histories and biographies relating to the East, among them being "A History of Afghanistan" (1851–1853); "History of the Administration of the East India Company" (1853); "A History of the Sepoy War in India" (1857–1858; London, 1864–1875), a comprehensive narrative of the celebrated mutiny down to the fall of Delhi; "Lives of Indian Officers" (1867). He died in 1876.

Kayes, or **Khayes** (kä-yās′), a town of the French Sudan, on the river Senegal, the terminus of the railway and river service from St. Louis; pop. 6,000.

Kazan (kä-zän′), a city of European Russia, capital of the province of the same name; on the Kasanka, about 4 miles above its junction with the Volga. It is strongly fortified, with large wool-combing, weaving and dyeing establishments, tanneries and soap works, and a government dockyard in its vicinity. The timber, flour, and hemp fairs of Kazan are of the largest in the Russian Empire. The university is a great seat for Oriental learning, with nearly 1,000 students. Pop. (1897) 131,508. KAZAN, the province, is surrounded by the provinces of Viatka, Orenburg, Nijni-Novgorod, and Simbirsk; area 24,601 square miles; domiciled pop. (1897) 2,191,058. It is well watered by the Volga, the Kama, the Sura, the Viatka, the Kasanka; the climate is temperate; agriculture, cattle-raising, and fishing are the chief occupations.

Kazimierz. See CASIMIR.

Kazvin (käz-vēn′), a town of Persia, 95 miles N. W. of Teheran, on the road to Resht. It manufactures brocade, velvet, cotton, and iron ware, and breeds camels and horses. Kazvin has obtained a new commercial importance through the opening of the Transcaucasian railway; the route connecting Persia with Europe goes by Kazvin to Resht and Baku, and to facilitate this communication a causeway has been constructed from Teheran to Kazvin. Pop. about 40,000.

Kea, the native New Zealand name for a genus of parrots, of which only three species are known: *Nestor notabilis, N. meridionalis,* and *N. productus,* the last appearing to have just become extinct. *N. notabilis* is a mountain species, confined to the South Island; it was originally a vegetable and insect feeding bird, but on the introduction of sheep it began to frequent the station and to feed on offal; later on the parrot acquired the more objectionable habit of destroying live sheep. A number of birds band themselves together and hunt out a weakly member of a flock, generally at night. The sheep is worried to death by the combined efforts of the parrots, which then proceed to devour the kidney fat.

Kea. See CANG.

Kean, Charles John, an English actor; son of Edmund Kean; born in Waterford, Ireland, Jan. 18, 1811. He was educated at Eton, but being thrown on his own resources in 1827 he took to the stage, and made his début at Drury Lane as Young Norval. In 1830 he visited America, established his reputation, and reappeared as a leading actor in London in 1838, among his parts being Hamlet and Richard III. He married the accomplished actress Ellen Tree in 1842, revisited the United States in 1845, and in 1851 became sole lessee of the Princess' Theater, London, where he put some of Shakespeare's plays on the stage with

a splendor never before attempted. In 1863 he made a tour to Australia, California, Jamaica, the United States, Canada, etc., which proved a great financial success. On his return he continued to play in London and the provinces till a short time before his death. He inherited little of his father's genius, and his success was largely due to effective staging. He died in London, England, Jan. 22, 1868.

Kean, Edmund, an English actor; born in London, Nov. 4, 1787. His parentage is doubtful, for, though Nance Carey, daughter of George Savile Carey, was his mother, it is quite uncertain who the father was. Kean is said to have declared himself to be an illegitimate son of the Duke of Norfolk. Nance Carey being an actress, Kean from his infancy made occasional appearances on the stage, and when about 16 years old became a regular "stroller," playing in Richardson's show and other temples of the itinerant drama. After 10 years' painful experience in various provincial circuits he succeeded in obtaining an engagement at Drury Lane Theater, where he made his famous first appearance as Shylock, Jan. 26, 1814. His success was immediate, and he at once took rank as the first actor of the day, displacing even John Philip Kemble, whose powers were by this time declining. A period of wonderful success followed; but unhappily Kean's irregularities were as great as his genius, and he gradually forfeited the public approval, his reputation being finally ruined by the notorious law-suit of Cox *v.* Kean (January, 1825). In this wretched case Kean was found guilty of misconduct with the wife of one Alderman Cox; and an outburst of popular morality literally drove him off the stage, Edinburgh particularly distinguishing itself in vigorous denunciation of the unfortunate actor. Kean then paid a long visit to America, where he had on a previous visit been very popular. On his return at the end of 1826 he was cordially received; but both mind and body had given way in his wild career, and he was the mere wreck of his former self. At last, March 25, 1833, he broke down hopelessly, while playing Othello to the Iago of his son Charles, and never acted again. Regarding Kean's genius as an actor there can be no question. In the mental agony of Othello, the wild passion of Shylock, or the cynical devilry of Richard he was unapproachable. No better idea of the irregular grandeur of his playing can be given than is contained in Coleridge's saying that "seeing Kean act was reading Shakespeare by flashes of lightning." He died in Richmond, May 15, 1833.

Keane, Lord John, a British military officer; born in Belmont, Ireland, in 1781. He entered the British army when a boy; served in Egypt, and in Spain during the Peninsular war, becoming a Major-General; was superseded in the command of the British expedition against New Orleans in 1814 by Pakenham; was severely wounded at the battle of New Orleans. He died in Hampshire, England, Aug. 24, 1844.

Keane, John Joseph, an American clergyman; born in Ballyshannon, County Donegal, Ireland, Sept. 12, 1839. In 1846 he was brought by his family to the United States; was educated in Maryland; ordained in the Roman Catholic Church in 1866; assistant rector of St. Patrick's Church, Washington, D. C., 1866–1878; became Bishop of Richmond, Aug. 25, 1878; rector of the Catholic University of America in 1886; was transferred to the titular see of Ajasso Aug. 29, 1888; and succeeded to the archbishopric of Dubuque, Ia., July 24, 1900.

Kearney, a city and county-seat of Buffalo co., Neb.; on a canal extending from the Platte river, which furnishes power for manufacturing, and on the Union Pacific and Burlington Route railroads; 198 miles S. W. of Omaha. It is the farming, stock-raising, and manufacturing trade center for the surrounding country; has a large cotton mill, electric flour mill, machine shops, and other industries; and is the seat of the State Normal School and Platte College. Pop. (1900) 5,634; (1910) 6,202.

Kearney, Denis, an American agitator; born in Oakmont, County Cork, Ireland, in 1847; followed the sea in 1858–1872; became foreman of a gang of stevedores in San Francisco in 1872, soon after starting in the draying business for himself; took an interest in politics. In 1877, owing to interference with his business, he began to excite the workingmen of San Francisco against capital, Chinese labor, etc., mass meetings being held in a suburb called the "Sand-lots." The movement instigated by him finally succeeded in packing a convention and organizing a new constitution in its own interest for the State of California. In the summer of 1878 he visited and spoke throughout the East, attended by a private secretary, but failed to make much impression. He died April 24, 1907.

Kearny, Stephen Watts, an American military officer; born in Newark, N. J., Aug. 30, 1794; left Columbia College to enter the American army as 1st lieutenant in the 13th United States Infantry, in March, 1812; distinguished himself at Queenston Heights; promoted captain in April, 1813; after the war, was promoted through various grades, becoming Brigadier-General in 1846. In the Mexican War, commanding the Army of the West, he conquered New Mexico; and establishing a provisional government at

Santa Fé he proceeded to California, where, Dec. 6, 1846, he fought the battle of San Pascual, in which he was twice wounded. He took part in the battles of San Gabriel and Plains of Mesa, Jan. 8 and 9, 1847; was governor of California, March to June, 1847; governor of Vera Cruz, March, 1848; of the city of Mexico, May, 1848; brevetted Major-General. He wrote "Manual for the Exercise and Manœuvering of United States Dragoons" (1837); "Organic Law"; "Laws for the Government of New Mexico" (1846). He died in St. Louis, Mo., Oct. 31, 1848. See FREMONT, JOHN CHARLES: STOCKTON, ROBERT FIELD.

Kearny, Philip, an American military officer; born in New York city, June 2, 1815. Though educated for the law, he, at the age of 22, entered the 1st United States dragoons as 2d lieutenant, and was, shortly afterward dispatched by the government to Europe, to study and report upon the system of tactics pursued in the French cavalry service. After entering the Ecolé Polytechnique, Paris, and serving as a volunteer in the ranks of the Chasseurs d'Afrique in an Algerine campaign, Kearny returned to the United States in 1840. From 1841 to 1844 he acted as aide to General Scott, and in 1846 became captain. Kearny served throughout the Mexican campaign, and was brevetted major for his distinguished gallantry at Contreras and Churubusco. On the termination of the war he commanded a force sent against the Indians of the Columbia River. In 1851, resigning his commission, he went to Europe, and served as volunteer aide-de-camp on the French staff throughout the Italian campaign of 1859, being present at the battles of Magenta and Solferino. On the outbreak of the Civil War in 1861, Kearny hastened home, was appointed Brigadier-General of volunteers in May, and while in command of a division of General Heintzelman's corps, exhibited his dashing courage in all the battles of the Chickahominy campaign. In 1862 (July 4) he was commissioned Major-General of volunteers, and was killed while making a personal reconnoisance within the Confederate lines at Chantilly, Sept. 1, following.

Kearsarge. (1) A mountain 3,250 feet high, situated in Carroll co., N. H.; (2) a mountain 2,950 feet high, in Merrimac co., N. H.

Kearsarge, The, a ship of the United States navy which played a conspicuous part in the only sea-fight of the Civil War. She was launched at Portsmouth, N. H., in September, 1861. She had an armament of seven guns; two 11-inch Dahlgren, one 30-pounder rifle, and four light 32-pounders. She carried 163 men in all, and was commanded by Capt. JOHN A. WINSLOW (*q. v.*). On June 10, 1864, while off the coast of Cherbourg, France, she fell in with the Confederate cruiser "Alabama," accompanied by the English yacht "Deerhound." A fierce battle ensued lasting for two hours, when the Confederate colors were struck and a white flag raised. Soon after, the "Alabama" went down, the officers and crew being rescued by the "Kearsarge" and the "Deerhound." The "Kearsarge" was wrecked Feb. 2, 1894, on a reef in the Caribbean Sea.

Kearsarge, The, a twin-screw, steel battleship of the United States navy, launched, with her sister ship, the "Kentucky," at Newport News, March 24, 1898. Her dimensions, armament, etc., are as follows: length on load-water line, 368 feet; beam extreme, 72 feet 2.5 inches; mean draft, 23 feet 6 inches; displacement, 11,525 tons; horse power, 10,000; speed, 16 knots per hour; main battery, four 13-inch, four 8-inch, and fourteen 5-inch rifles; secondary battery, twenty 6-pounders, six 1-pounders, and four machine guns; cost, about $4,000,000. She carries a complement of 511 men. Both the "Kearsarge" and the "Kentucky" are fitted with superimposed turrets, an experiment whose usefulness has been questioned by naval experts.

Keary, Annie, an English novelist; born in Bilton, Yorkshire, England, March 3, 1825. Her father was rector in Bilton, having sold out of the army and taken orders after the loss of his estate in County Galway, Ireland. Her sympathetic insight into the hearts of children gave her the first impulse to write, and made the success of "Little Wanderlin" and the "Heroes of Asgard" (written together with her sister Eliza), as well as the later books, "A York and a Lancaster Rose," "Mia and Charley," and "Rival Kings." Two admirable books outside her usual province were "Early Egyptian History" and "The Nations Around." Her first novel was "Through the Shadows," and this was followed by "Janet's Home," "Clemency Franklyn," and "Oldbury." "Castle Daly" was hailed as an Irish novel of unusual excellence. Her latest work, and perhaps her greatest, was "A Doubting Heart." She died in Eastbourne, Sussex, England, March 3, 1879.

Keats, John, an English poet; born in London, England, Oct. 29, 1796; was apprenticed to a surgeon, but gave way to the ambition of becoming a poet. Leigh Hunt lent the kindly sanction of his name to the first poems Keats published in 1817. In the next year he published "Endymion," a poetical romance, and, in 1820, his last and best work, "Lamia," and other poems. These poems were very roughly treated by Gifford in the "Quarterly Review," and Keats, with his over-sensitive nature, took

it too much to heart. Being in feeble health, from a severe pulmonary disease, he was advised to try the climate of Italy,

JOHN KEATS.

where he arrived in November, 1820. Shelley lamented his poet friend in the beautiful and well-known "Adonais." He died in Rome, Italy, Feb. 23, 1821.

Kebbel, Thomas Edward, an English author; born in Leicestershire, England, Nov. 23, 1828. Educated at Oxford, he became a lawyer and afterward engaged in journalism, being connected with the "Press" (1855) and the "Day" (1867) as political writer. He has written on political topics: "Essays upon History and Politics" (1864); "English Statesmen since the Peace of 1815" (1868); "A History of Toryism" (1885); and biographies of Lord Beaconsfield and Lord Derby in the "English Statesmen" series. His more recent works are: "The Old and the New English Country Life" (1891); "Sport and Nature" (1893).

Keble, John, an English poet; born in Fairford, Gloucestershire, England, April 25, 1792. He was remarkable for great beauty of character. Going to Oriel as a fellow, he became college tutor, public examiner, and professor of poetry. He was ordained deacon in 1815, acted as his father's curate for some time, and was appointed to the vicarage of Hursley, near Winchester, in 1836, a position which he held until his death. The work by which he is best known is the volume of hymns entitled "The Christian Year." He was also author of the "Lyra Innocentium," and in conjunction with Dr. Newman, Rev. Mr. Froude, and others, of the "Lyrica Apostolica." He was associated with Drs. Newman and Pusey in getting up the first series of the famous "Tracts for the Times" (1833). Of his great work 'The Christian Year" (2 vols. 1827), which he published anonymously, in 1872 appeared in the 158th edition; over 500,000 copies in all have been sold. It has been illustrated and illuminated, books have been made from and written on it, including a concordance, and from its profits the author built one of the most beautiful parish churches in England. He died in England, March 27, 1866.

Keble, College, one of the colleges of Oxford University, built by subscription as a memorial of the Rev. John Keble, and incorporated in 1870 by royal charter. The charter declares it to be "founded and constituted with the especial object and intent of providing persons desirous of academical education, and willing to live economically, with a college wherein sober living and high culture of the mind may be combined with Christian training, based upon the principles of the Church of England." The college is a flourishing institution, and has the patronage of about a dozen livings.

Keddie, Henrietta, pseudonym SARAH TYTLER, an English writer; born in 1827. She was the author of several graceful and readable stories, the best known being: "Days of Yore" (1864); "Citoyenne Jacqueline" (1865); "Noblesse Oblige" (1869); "French Janet"; "A Loyal Little Maid" (1899). Of her miscellaneous works, designed chiefly for juvenile readers, may be noticed: "Modern Painters" (1873); "Children of a Hundred Years Ago" (1876); "Jane Austen and her Works" (1880); "Marie Antoinette: the Woman and the Queen" (1883).

Kedge, a small anchor used to keep a ship steady and clear from her bower anchor, while she rides in a harbor or river, also in removing her from one part of a harbor to another.

Kedjeree, a dish prepared by the natives of India. It is of two kinds: white and yellow kedjeree. The white consists of green grain or rayed kidney bean (*Phaseolus aureus*), onion, rice, ghee (clarified butter), cloves, pepper and salt. Yellow kedjeree is the white, with eggs and a coloring of turmeric.

Kedron, or **Kidron,** spoken of as a "brook" in the English Bible, should rather be called (as in John, xviii: 1, new version, margin) "ravine" or "winter torrent." It is a gorge close to Jerusalem on the E., running away in the direction of the Dead Sea. Water never flows in it save during the heavy rains of winter. At other times it is a dry wady.

Keel, in botany, (1) the two lower petals of a papilionaceous corolla which adhere by their margins so as somewhat to resemble the keel of a boat; called also carina. (2) the midrib of a leaf or petal, etc., elevated externally. As a nautical term, a low, flat-bottomed vessel used in the river Tyne; a coal-barge. In shipbuilding, the lower longitudinal beam of a vessel, answering to the spine, and from which

the ribs proceed. In wooden vessels an additional timber beneath is called the false keel. A sliding keel is a board amidships, working in a trunk in the line of the keel, and extending from the bottom to the deck. It is lowered to prevent a vessel's making leeway when sailing with a side wind. In zoölogy, a projecting ridge along any surface; as, for instance, the back or horns of an animal.

Keeley, Leslie E., an American physician; born in 1842; was graduated at Rush Medical College in 1864. He founded the Keeley Institute system for the cure of inebriety and the use of narcotics, commonly known as the gold or Keeley cure, and was president of the company which bears his name. He died in Los Angeles, Cal., Feb. 21, 1900.

Keel=haul, or **Keel=hale,** to punish in the seamen's way by dragging the offender under water on one side of the ship and up again on the other by ropes attached to the yard-arms on either side. In small vessels the culprit is drawn under the craft from stem to stern.

Keeling, or **Kokos Keeling, Islands,** a group of about 20 small coral atolls in the Indian Ocean, lat 12° S., and about 500 miles S. W. of Java; pop. (1891) 554. They are covered with cocoanut palms, whence oil is extracted; pigs and rats are the only mammals; there are no land birds but poultry; crabs, large and small abound. These islands were discovered by Captain Keeling in 1609 and were visited by Darwin in 1836; it was on his study of them that he based his subsidence theory of the formation of coral reefs. They were again studied by Mr. Guppy in 1888, who came to a conclusion as to their origin favorable to John Murray's view. They were annexed to England in 1857.

Keelson, or **Kelson,** in shipbuilding, a longitudinal piece above the floor timbers, binding them to the keel. The sister keelsons lie on each side of the keelson; also called side keelsons. The intercostal keelson is a short piece between frames. Rider keelsons are auxiliary keelsons placed above the main keelson to give additional strength. Heavy timbers lying athwart the main keelson are cross keelsons, for sustaining the engines and boilers of steamships.

Keely, John Ernest Worrell, an American adventurer; born in Philadelphia, Pa., Sept. 3, 1837. In early life he was a carpenter, and afterward was attached to a circus as sleight-of-hand performer. Prior to 1872 he became interested in music, and afterward claimed that the tuning-fork had suggested to him a new motive power. For 25 years he succeeded in deceiving the people of two continents in claiming to have discovered the hidden force moving the universe, and to have utilized this force in a machine known as the Keely motor. He died in Philadelphia, Pa., Nov. 18, 1898.

Keely Motor, a machine exhibited after years of experiment by John E. W. Keely, and which appeared to have great power, its noise, according to him, being produced neither by steam, electricity, nor compressed air, but by the vibrations of a violin bow. This machine was called the "Keely motor," and in 1874 a stock company was established which contributed thousands of dollars to enable him to perfect his alleged discovery. From 1872 to 1891 he built and rejected 129 different models; in 1881 a wealthy woman of Philadelphia built a new laboratory for him, and also furnished a weekly salary, that he might continue his experiments. At various exhibitions he produced wonderful effects, but never revealed how these were accomplished, and it was only after his death that the whole scheme was found to be a fraud, his machine having been operated by a compressed air motor in the cellar.

Keen, William Williams, an American surgeon; born in Philadelphia, Pa., Jan. 19, 1837; was graduated at Brown University in 1859, and at Jefferson Medical College in 1862; assistant surgeon 5th Massachusetts regiment in 1861; acting assistant surgeon United States army, 1862–1864; studied in Europe 1864–1866; was head of the Philadelphia School of Anatomy 1866–1875; lecturer on pathological anatomy at Jefferson Medical College 1866–1875; Professor of Artistic Anatomy at the Pennsylvania Academy of Fine Arts 1876–1890; of surgery at the Women's Medical College 1884–1889, and of Surgery at Jefferson Medical College 1889. He paid special attention to the surgery of the nervous system; was a pioneer in cerebral surgery; in 1890 published experiments with the injection of filtered air for the determination of rupture of the bladder; in 1891 proposed relieving spasmodic wryneck by the exsection of the nerves supplying the posterior rotator muscles of the head. He wrote "Keen's Clinical Charts" (1870); "Early History of Practical Anatomy" (1870); etc. He edited "American Health Primers" (1879–1880); "Gray's Anatomy" (1887); "American Text Book of Surgery" (1899); etc. He received the degree of LL. D. from Brown University in 1892; became honorary fellow of the Royal College of Surgeons of England in 1900.

Keene, city and county-seat of Cheshire co., N. H.; on the Ashuelot river and the Boston and Maine and the Fitchburg railroads; 50 miles S. W. of Concord, the

State capital. It is the trade center for a farming and manufacturing section having a population of 30,000; is surrounded by high hills, a part of the Monadnock mountains 10 miles distant; and contains the repair shops of the Fitchburg railroad, public high school with full college preparatory course, Unitarian Invalids' Home, Elliot City Hospital, Ladies', Wheelock, and Trotting Association Parks, and manufacturies of woolen and flannel goods, machinery, woodenware, etc. Pop. (1890) 7,446; (1900) 9,165; (1910) 10,068.

Keene, Charles Samuel, an English illustrator; born in Hornsey, near London, Aug. 10, 1823; was apprenticed at wood-engraving at the age of 19; worked for illustrated journals, especially "Punch" (1851–1891). Many of his designs appeared in "Punch's Pocket-Book," and the large etchings were engraved by him. He drew for "Once a Week"; illustrated Charles Reade's "A Good Fight"; George Meredith's "Evan Harrington"; Douglas Jerrold's "Mrs. Caudle's Curtain Lectures"; Mark Lemon's "Number Nip"; and received a medal at the Paris Exposition of 1889. He died in London, Jan. 4, 1891.

Keene, Laura, an American actress; born in England in 1820. She came to the United States in 1852 and made her home here the remainder of her life. She was for a time manager of the Varieties Theater in New York, and 1855–1863 was the lessee of the Olympic, at first called "Laura Keene's Theater." Among the new plays she produced was "Our American Cousin," with Jefferson and Sothern in the cast. It was while witnessing this play at Ford's Theater in Washington that President Lincoln was assassinated, and Mrs. Keene was one of the first to reach his side and attempt to relieve him. She died in Montclair, N. J., Nov. 4, 1873.

Keeners, Irish singing mourners, who, in olden times, were hired to howl at funerals, in perpetuation of a heathen custom derived from a Phœnician ancestry. The duty of professional keeners was undertaken by the females of the family, or acquaintances of the deceased. After the body had been dressed in grave clothes, adorned with flowers, and placed upon a bier, the chief keener arranged his followers at the foot and head of the corpse, and recited at the first the Caoinan, in which were described the virtues and possessions of the departed. This eulogy, sung softly, and accompanied upon the harp, was followed by a full chorus of all assembled. The process was repeated during the wake or vigil before the burial, the keeners sometimes following the corpse to the grave. When the body was laid down for the purpose of resting the bearers, or the procession came in sight of a wayside cross or chapel, the keening was suspended, and all present knelt to say in silence an ave or a Paternoster.

Keep, in castles of the old type, a kind of strong tower, to which the besieged retreated and made their last efforts of defense.

Keeve, a large vessel or vat used: (1) For mashing, fermenting, or storing beer. (2) For holding a bleaching liquor or alkaline lye; same as keir. (3) For elevating ores; same as corf. (4) An iron-bound tub of a truncate, conical form, set on the smaller end, and used for collecting the fine grains of copper. In use it is kept half full of water, and the contents agitated by a shovel till the heavier particles sink to the bottom, leaving the water to be dipped out and the refuse lighter upper stratum to be removed.

Keewatin (kē-wä'tin), a district of Canada, bounded on the S. by Manitoba from its N. E. corner to the W. shore of Lake Winnipeg; on the W. by the shore of the lake to near Norway House, whence the boundary goes in a N. direction to lat 55°, at the point where it intersects the Nelson river, and then passes W. to the 100th degree of longitude, which it follows N. to the limits of Canadian territory; on the E. by a continuation of the E. boundary of Manitoba till it reaches Hudson Bay, where it follows the coast line to the N. limits of the Dominion; area, 756,000 square miles. It is administered by the lieutenant-governor of Manitoba, but is nearly uninhabited, excepting by Eskimos in the N. Norway House, an important station of the Hudson Bay Company, and one or two other posts belonging to that corporation, are the only settlements in the districts. The principal attraction is the game, large and small, with which it abounds. In some parts valuable minerals are believed to exist, but they have not been developed. The country is well watered and timbered in many places, but is not suitable for cultivation to any extent. It embraces the N. part of Lake Winnipeg, with its important fisheries, and includes the mouth of the Saskatchewan river, which is navigable, except for a short distance, for nearly 1,000 miles. The Nelson river passes through the province, as well as the Churchill and numerous smaller streams; and the Chesterfield Inlet on the W. side of Hudson Bay penetrates nearly to its W. boundary. It was created a district April 12, 1876. Pop. (1901) 8,546. See HUDSON BAY.

Keff, or **El-Keff,** a walled town of Tunis, 95 miles S. W. of the capital, on the side of a steep hill. It was noted in Carthaginian times for its temple to Astarte. There exist a ruined temple, thermæ, and cisterns of Roman construction.

Kehl (kāl), a town of the grand-duchy of Baden, circle Middle Rhine, on the Rhine, immediately opposite Strasburg, and 10 miles N. W. of Offenburg. Kehl was formerly a fortress, and esteemed an important bulwark of Germany. It was fortified by Vauban in 1688, ceded by France to Baden in 1697, taken by the French in 1703, 1733, 1793, and 1796; by the Austrians, also, in the latter, and again taken by the French in the year following. After the peace its fortifications were dismantled. The town is connected by a fine bridge with the opposite bank of the Rhine, and with Strassburg. Pop. (1900) 3,008.

Keighley (kēth'li), a market and manufacturing town in the West Riding of Yorkshire, England, on the Aire, 9 miles N. W. of Bradford and 17 W. N. W. of Leeds. It has a parish church (rebuilt 1848), a Gothic mechanics' institute (1870–1887), the Drake trade school (1713; rebuilt 1860), extensive waterworks (1876), and two public parks of 9 and 15 acres; manufactures worsted and woolen goods, worsted spinning machinery, and sewing and washing machines. Pop. (1901) 41,565.

Keightley (kīt'li), **Thomas,** an English writer; born in Dublin, Ireland, in October, 1789. He was educated at Trinity College there. In 1824 he settled in England to a life of letters. His histories of Rome, Greece, and England held their place as school manuals till superseded by later books; of less moment were his notes to Vergil and Horace. But his "Fairy Mythology" (1850) largely retains its value, as also to a less extent does his "Life, Writings, and Opinions of Milton" (1855), and his annotated edition of Milton (1859). He died in Erith, Kent, England, Nov. 4, 1872.

Keim, Theodor (kīm), a German theologian; born in Stuttgart, Würtemburg, Dec. 17, 1825. He was Professor of Theology at Zurich in 1860 and at Giessen in 1873. He wrote "History of Jesus of Nazareth" and several works on the Reformation. He died in Giessen, Hesse, Nov. 17, 1878.

Kei (kā) **River, Great,** a river of South Africa, which in 1848 was made the boundary between Cape Colony and Kaffraria. Transkei is a magistracy of Kaffraria, comprising Fingoland, the Idutwya Reserve, and Gcalekaland, and lying between the Great Kei river and the boundary of Pondoland; area, 2,552 square miles; pop. (1891) 153,563. The magistracy forms, administratively, part of Cape Colony.

Keiser, Reinhard (kī'zer), a German composer; born in Leipsic in 1673. He was the author of 118 operas, of which his "Circe," brought out at Hamburg in 1734, was the last and most beautiful. He possessed a most fertile imagination and is considered as the father of German melody. He died in Hamburg, Sept. 12, 1739.

Keiskama (kīs-kä'mä), a river in South Africa, formerly the boundary between Cape Colony and British Kaffraria.

Keith, Admiral Lord. See ELPHINSTONE, G. K.

Keith, James, known as MARSHAL KEITH, a Russian and Prussian military officer; born near Peterhead, Scotland, June 11, 1696. He studied law at Aberdeen and Edinburgh; in 1715 engaged with his brother in the Jacobite rising, and in 1719 in Alberoni's expedition to the West Highlands, which ended in the "battle" of Glenshiel. Both times the brothers escaped to the Continent; and James held for nine years a Spanish colonelcy and took part in the siege of Gibraltar (1726–1727). But his creed, the Episcopal, was against him; and in 1728 he entered the Russian service as a Major-General. He distinguished himself in the wars with Turkey and Sweden, particularly at the siege of Otchakoff (1737) and the reduction of the Aland Islands (1743). To be healed of a wound received on the former occasion he visited Paris, and thence crossed over to London, where he made his peace with the Hanoverian government. In 1747, finding the Russian service disagreeable, he exchanged it for that of Prussia. Frederick the Great knew his merits and gave him at once the rank of Field-Marshal. From this time his name is associated with that of the King of Prussia, who relied as much on Keith's military genius as he did on the diplomatic ability of his brother, the Earl Marischal, whom he dispatched on embassies to Paris and Madrid. Keith's talents became still more conspicuous on the breaking out of the Seven Years' War (1756). He shared Frederick's doubtful fortunes before Prague, was present at the victories of Lobositz and Rossbach, and conducted the masterly retreat from Olmütz. He was killed at the battle of Hochkirch, Oct. 14, 1758.

Kekulé, Friedrich August (ke-kö'le), a German chemist; born in Darmstadt in 1829. He was ennobled as Von Stradowitz in 1895, and became professor at Ghent and at Bonn (1865). He made important researches in the chemistry of the organic substances, and published a famous handbook of organic chemistry (1861–1867). He died in 1896.

Kelát, Khelat, or **Kalat** (ke-lät'), the capital of Baluchistan, at an elevation of more than 7,000 feet; seated on the summit of a hill, it is a place of great military importance. It was occupied by England (1839–1841); and in 1877 a treaty was concluded with the khan by which a Brit-

ish agent, with military escort, became resident at the court of Kelát. In 1888 Kelát was formally incorporated with the Indian empire as a British possession. Pop. about 14,000. See BALUCHISTAN.

Kelat-i-Ghilzai, a fortress of Afghanistan, 75 miles N. E. of Kandahar.

Kelati Nadiri (ke-lä'tē nä-dē'rē), one of the strongest natural fortresses in the world, in the Persian province of Khorasan, and close to the Russian frontier of Transcaspia. It was raised by Nadir Shah as a defense against the Turkomans on an elevated valley in the Hezar Musjid mountain, and shut out from external communication by lofty hills with precipices of 300 to 600 feet. Owing to Russia's schemes on Khorasan, Kelati Nadiri has gained considerable importance.

Kellaways Rock, the name given to highly fossiliferous beds of sand and calcareous sandstones which occur near the base of the Oxford clay.

Keller, Gottfried, a German poet and novelist; born in Zurich, July 19, 1819. Original in execution, he was a keen observer, genuinely artistic, and with a strong sense of humor, sometimes extravagantly indulged. In his best vein he goes straight to the heart. To romanticism in motifs, processes, and characters, he joined realism in execution. His writings disclose the fact that he was a painter before being an author. An impression of his poetical genius may be obtained from "Complete Poems" (3d ed. 1888). Of his novels, "Seldwyla Folk" (1856) is one of the best. ("Works," 11 vols. 1889-1893.) He died in Zurich, July 16, 1890.

GOTTFRIED KELLER.

Keller, Helen Adams, an American author; born in Tuscumbia, Ala., June 27, 1880. She became famous for her intellectual triumphs over the disability of being deaf, dumb, and blind. When nineteen months old she lost sight and hearing through an attack of scarlet fever. In her eighth year her education was begun by Anne Mansfield Sullivan, who had been trained at the Perkins Institution in Boston. The pupil made rapid progress, and after learning to read and write and to use the manual alphabet, she began to learn to speak. Within a month she acquired the power of intelligible speech, and in course of time she became a proficient converser in English, French, and German. After special tuition at the Wright-Humason School and at the Cambridge School, in 1900 she entered Radcliffe College, where she was graduated in 1904. In 1905 she was elected a vice-president of the New York State institution for promoting the interests of the blind. Besides contributing to numerous periodicals, she has written "The Story of My Life" (1903) and "Optimism," an essay (1903).

Kellermann, François Christophe, a marshal of France; born in Strasburg in 1735. Early entering the service of his country, he gained great distinction in the Seven Years' War, during which he rose to the rank of brigadier. Having joined the popular side on the breaking out of the Revolution, he was given the command of the army of the Moselle or the North, and in 1792 gained the splendid victory of Valmy over the Prussians, and though he for a time fell under the suspicion of the Convention, he was, in 1795, intrusted with the command of the armies of Italy and the Alps. After the rise of Napoleon, Kellermann became a subordinate commander; but his services to France were acknowledged by a marshal's baton and an imperial senatorship in 1804, and by the title of Duke of Valmy, in honor of his former victory, in 1809. At the Restoration he joined the Bourbons, and in 1814 Louis XVIII. created him a peer. He died Sept. 12, 1820.

Kelley, Edgar Stillman, an American composer; born in Sparta, Wis., April 14, 1857; studied music in the United States and in Stuttgart, Germany; settled in San Francisco, composing there incidental music to "Macbeth"; later in New York, where he became special instructor in composition in the New York College of Music, and where his very successful opera "Puritania" was produced in 1892; composed also Chinese orchestral suite "Aladdin"; music to "Prometheus Bound"; music for dramatic production of "Ben Hur" (1899); etc. In 1901 he became an instructor in music at Yale University.

Kelley, William Darragh, an American legislator; born in Philadelphia, Pa., April 12, 1814. After receiving a common school education he was apprenticed to a jeweler, and he worked at his trade for five years in Boston. Returning to Philadelphia in 1839, he studied law and was admitted to the bar in 1841. He took part in politics as a Democrat and was attorney-general of Pennsylvania 1845-1846. He was judge of the court of common pleas 1846-1856, and in the meantime joined the Republican party. He was elected to Congress in 1860,

and remained there by successive elections till his death. He was known as the "Father of the House" and as "Pig-Iron Kelley." He died in Washington, D. C., Jan. 9, 1890.

Kellgren, Johan Henrik (kel'gren), a Swedish poet; born in Floby, West Gothland, Dec. 1, 1751. He excelled especially in lyrics, of which one of his finest is "Nya Skapelsen" (The New Creation). Gustavus III., whose private librarian and secretary he was, furnished the plots of most of his dramas and operas, he himself contributing merely the versification. He died April 20, 1795.

Kellogg, Clara Louise, an American opera singer; born in Sumterville, S. C., July 12, 1842. She obtained her musical education in New York city, with the exception of a few lessons taken in London, England. Her first appearance in opera was in 1861 at the Academy of Music in New York city, when she assumed the rôle of Gilda in "Rigoletto." From that time on she held an enviable place in the affections of the American public and was also most cordially received in England, which country she visited several times, twice singing before Queen Victoria in Buckingham Palace. Her voice was a pure and flexible soprano and her execution brilliant. She had an extensive repertoire, including 45 operas. In 1874 she organized an English opera company and with it visited nearly every part of the United States. In 1887 she was married to Carl Strakosch and retired to private life.

Kellogg, Edgar Romeyn, an American military officer; born in New York city, March 25, 1842; served through the Civil War; distinguished himself at Murfreesboro, during the Atlanta campaign, and at Jonesboro; promoted captain in 1865; colonel, 1898; Brigadier-General, 1899; and commanded the 10th United States Infantry at the battle of San Juan Hill, Cuba, July 1, 1898.

Kellogg, Samuel Henry, an American theologian; born in Quogue, Long Island, N. Y., Sept. 6, 1839; was graduated at Princeton College in 1861 and at the Theological Seminary in 1864; was ordained in the Presbyterian Church and went as a missionary to India, where he remained till 1877; returned to India in 1892 and remained there till his death. His publications include "A Grammar of the Hindi Language" (1876); "The Jews: or, Prediction and Fulfilment" (1883); "The Light of Asia and the Light of the World" (1885); "The Genesis and Growth of Religion" (1892); "From Death to Resurrection" (1885); etc. He died in Landour, India, May 2, 1899.

Kells (originally Kenlis), an ancient town of County Meath, Ireland; on the Blackwater, 26 miles W. of Drogheda. It has several interesting antiquities, including St. Columba's house, a round tower, and three or four stone crosses. Kells was made the center of a bishop's see in 807; this was united to the see of Meath in the 13th century. A manuscript copy of the gospels, called the "Book of Kells," is beautifully executed with colored Celtic ornamentation, and is believed to be the work of the 9th century. It is now preserved in the library of Trinity College, Dublin. See ILLUMINATION OF MANUSCRIPTS.

Kelly, James Edward, an American sculptor; born in New York city, July 30, 1855; studied art at the National Academy of Design; was illustrator for several magazines till 1884, since when he has devoted himself to sculpture. In 1895 he furnished the Long Island panel, and in 1897 the memorial of the battle of Harlem Heights on the grounds of the Columbia University, both for the Sons of the Revolution; and in 1901 was engaged on a monument to commemorate the defense of New Haven for the same society.

Kelly, John, an American politician; born in New York city, April 21, 1821; received a public school education; was a Democratic member of Congress in 1855–1859; comptroller of New York city in 1876–1880; and was prominent in the struggle against the Tweed ring in 1871. He died in New York city, June 1, 1886.

Keloid, or **Cheloid,** in pathology, an unsightly excrescence arising on the sternum or elsewhere, generally from the overactive growth of a cicatrix over a wound.

Kelp, the calcined ashes of seaweed, from which carbonate of soda is obtained. Kelp was formerly much used in the manufacture of soap and glass, but since barilla has been used for these purposes, the burning of sea-wrack has almost ceased. From the alkali of kelp the important chemical substance called IODINE (*q. v.*) is obtained. Also the sea-wrack or sea-weed from which kelp is produced.

Kelpie, or **Kelpy,** a sort of mischievous spirit, said to haunt fords and ferries at night, especially in storms. They generally appear in the form of a horse. See WATER WORSHIP.

Kelsey Beds, a subdivision of the Pleistocene accumulations, consisting chiefly of gravel, charged with marine shells and remains of mammoth, rhinoceros, etc., which occurs at Kelsey Hill near Hedon, and other places in the neighborhood of Hull, England. The gravel rests on and is covered by bowlder clay, and was probably deposited in the sea, near the mouth of a river.

Kelso, a market-town of Roxburghshire, Scotland; 23 miles by rail W. S. W. of Berwick-on-Tweed and 52 (by road 42) S. E. of Edinburgh. It stands on the N. bank of the Tweed, here joined by the Teviot, and spanned by Rennie's noble five-arch bridge (1803). In 1126 David I. translated to "Calchou" a Tironensian abbey, founded by him at Selkirk 13 years before. This, wrecked by the English under Hertford in 1545, is now represented by the stately ruin of its cruciform church, Romanesque and First Pointed in style, with a massive central tower 91 feet high. Across the river, on the peninsula formed by the Teviot, stood the royal castle and town of Roxburgh, demolished in 1460; and 1 mile W. is Floors Castle (1718–1849), the seat of the Duke of Roxburgh. Pop. (1901) 4,006.

Kelung, a town and seaport in the N. part of Formosa. It was opened to foreign commerce in 1863, and has since rapidly increased in importance. Coal fields are worked by Chinese in the neighborhood, and large quantities of coal are exported. There is also an extensive export trade in rice, sugar, and camphor. Pop. about 70,000.

Kelvin, Lord. See THOMSON, SIR WILLIAM.

Kemble, Adelaide, an opera singer; daughter of Charles Kemble; born in 1814. Her first success was attained in 1839, when she sang in Venice in "Norma," and thenceforward she grew in public favor. In 1843 she was married to Frederick U. Sartoris, and retired from the stage. In 1867 she published a book entitled "A Week In a French Country-House." She died Aug. 4, 1879.

Kemble, Charles, an English actor; brother of John Philip Kemble; born in Brecknock, Wales, Nov. 25, 1775. He was educated at Douay (France), returned to England in 1792, obtained a situation in the postoffice, but relinquished it in favor of the stage in 1794, when he made his first appearance at Drury Lane. His success was largely due to his representations of such characters as Edgar, Romeo, Charles Surface, Antony, etc., and to his fine voice, handsome face, and figure. He was appointed censor of plays in 1840, when he retired from the stage and only gave occasional Shakespearian readings. He had married the favorite actress Miss de Camp in 1806. He was the father of John Mitchell Kemble, Frances Anne Kemble, and Adelaide Kemble. He died in London, Nov. 12, 1854.

Kemble, Frances Anne, popularly known as FANNY KEMBLE, an Anglo-American writer and actress; eldest daughter of Charles Kemble, and niece of Mrs. Siddons; born in London, England, Nov. 27, 1809. Her father being in financial difficulties she was induced to appear on the stage in 1829 at Covent Garden as Juliet, and her success was so great that in the course of three years she managed to relieve the fallen fortunes of the family. Her trip to America in company with her father was also a splendid triumph; while there she contracted an unfortunate marriage (1834), which was annulled by divorce 15 years afterward. She lived for many years in Lenox (Mass.). She returned to London in 1847, and from that time resided alternately in the United States, England, and the Continent, appearing at intervals as a public reader. She wrote: "Francis I." (a tragedy, in which she herself acted the part of Louis of Savoy); "Journal of a Residence in the United States"; "Journal of a Residence on a Georgia Plantation"; "Records of a Girlhood"; "Records of Later Life"; "Notes" on some of Shakespeare's plays; etc. As an actress she excelled in the characters of Portia, Beatrice, Lady Macbeth, Lady Teazle, and of Julia in the "Hunchback." She died in London, England, Jan. 16, 1893.

Kemble, John Mitchell, an English Anglo-Saxon scholar, son of Charles Kemble; born in London, England, April 2, 1807. He was graduated at Cambridge, and, having taken up the study of Anglo-Saxon, spent a considerable time in studying the ancient MSS. in the libraries there. He edited Beowulf and other Anglo-Saxon works, including an incomplete edition of the Anglo-Saxon Gospels, and a collection of all the known characters of the Anglo-Saxon period, under the title of "Codex Diplomaticus Ævi Saxonici" ("Diplomatic Code of the Saxon Age"). Perhaps his most valuable work is the "Saxons in England" (1849). For a number of years he edited the "British and Foreign Review," and latterly he acted as censor of plays. He died in Dublin, Ireland, March 26, 1857.

Kemble, John Philip, an English tragedian; born in Prescot, near Liverpool, England, Feb. 1, 1757. He was eldest son of Roger Kemble, manager of a provincial theatrical company. Being intended for the Church he was sent to the Roman Catholic college of Douay (France), where he distinguished himself by his fine elocution, but, in spite of his parents' opposition he selected the stage as a profession, made his first appearance at Drury Lane in 1783, and became at once popular. He was afterward manager of this theater in 1788–1802. From 1801 to 1803 he made a most successful tour of France and Spain, and on his return to London purchased a share in the Covent Garden Theater, and made himself a splendid reputation in the characters of Julius Cæsar, Hamlet, Macbeth, Coriolanus, etc. His theater having been burned down, he opened the new edifice in 1809 with an increase of prices, which, together with certain other obnoxious arrangements, created for a series of nights the notable disturb-

ances known by the name of the "O. P. [old price] riots." He abandoned the stage in 1817 and received many tokens of esteem from his numerous admirers on that occasion. His statue was placed in Westminster Abbey in 1833. His acting was distinguished for dignity, precision, and studious preparation, but was wanting in fire and pathos. His sister, Sarah, was the celebrated Mrs. Siddons. He died in Lausanne, Switzerland, Feb. 26, 1823.

Kemény, Baron Zsigmond (kem'ā-nē), a Hungarian novelist; born in Magyar-Kapud in 1816. His romances and political writings are classics in Hungarian literature. Of the former, "Man and Wife" (1852) and "The Abysses of the Heart" (1854), both psychological studies, are among the best. "Studies" (2 vols. 1870) is an admirable work. The style of his writings and the tax they impose on thought make them not always easy to read, but what they demand they amply repay in pleasure and profit. He was called "prince of the Magyar journalists." He died in Puszta-Kamarás, Dec. 22, 1875.

Kemp, John, an English clergyman; born in Wye, Kent, England, in 1380; was educated at Oxford; commissioner to Aragon in 1415; arch-deacon of Durham in 1416; bishop of Rochester in 1419; of Chichester in 1421; of London in 1421 (November); Chancellor and Archbishop of York in 1426; resigned the Great Seal in 1432; became cardinal-priest and was joint ambassador to France in 1439; endowed the College of Wye in 1447; was chancellor again in 1450; and became Cardinal-bishop and Archbishop of Canterbury in 1452; died March 22, 1454.

Kempelen, Baron Wolfgang von (kem'pe-len), an Austrian mechanician; born in Pressburg, Hungary, Jan. 23, 1734. He invented a so-called automaton chess player (in which a living player was concealed) for the amusement of the Empress Maria Theresa (1769), exhibited in Paris (1784), and afterward in England and the United States; also an automaton speaking human figure in 1778. He held office at the Austrian Court and published poems and dramatic writings. He died in Vienna, March 26, 1804.

Kemper, Jackson, an American clergyman; born in Pleasant Valley, Dutchess co., N. Y., Dec., 24, 1789; was graduated at Columbia College in 1809; deacon in 1811; priest in 1812; rector of parishes in Philadelphia, Pa., for 20 years; rector in Norwalk, Conn.; missionary bishop of Indiana and Missouri; transferred to the Northwestern Territory (Iowa, Wisconsin, etc.); Bishop of Wisconsin in 1854; died in Delafield, Wis., May 24, 1870.

Kemper, Reuben, an American adventurer; born in Fauquier co., Va., in 1770; was bitterly opposed to the Spanish and devoted much of his time to seeking to drive them out of North America; commanded a force of 600 soldiers in aiding the Mexican insurgents in their conflict with Spain in 1812; and fought under General Jackson at New Orleans in 1815. He died in Natchez, Miss., Oct. 10, 1826.

Kempff, Louis, an American naval officer; born near Belleville, Ill., Oct. 11, 1841; was graduated at the United States Naval Academy in 1861; assigned to the "Vandalia" on blockade duty off Charleston; served with distinction throughout the Civil War; captured the schooner "Henry Middleton" and took part in the battle at Port Royal, S. C.; promoted captain in 1891; rear-admiral in 1899. When the Boxer troubles began in China in 1900 he was placed in command of the United States naval forces in Chinese waters. On May 29 he sent 108 marines ashore, who coöperated with the men landed from the other foreign warships in the harbor at Taku. An attempt was made to send this combined force to Peking where the foreign legations were besieged by Boxers, but it failed. Later, however, a part of the international troops, including 63 Americans, went to the capital by train, reaching there June 1. The troubles increased to such an extent that the foreign admirals at Taku, with the exception of Kempff, ordered the surrender of the forts at Taku and when this was refused bombarded them and compelled their surrender. At the time Admiral Kempff was censured, but later he showed that it was not the policy of the United States to commit any act which might be construed by the Chinese as a *casus belli*. The attack on the Taku forts he held was equivalent to a declaration of war against China. Admiral Kempff's action was approved by the United States government and later commended by statesmen throughout Europe.

Kempis, Thomas à (kem'pis), a German mystic; born in Kempen (whence his name, "Thomas from Kempen"), near Cologne, in 1380. His true name was Hamerken (Latin, Malleolus). Sub-prior of the monastery of Mount St. Agnes, near Zwolle, he was distinguished for piety and success as an instructor of youth. He was author of the "Imitation of Christ," one of the most famous of books, which has been universally read and has moved the hearts of men of all nations, conditions, and kinds for four centuries. Its title describes its contents; it abounds in maxims of humility and resignation, and is such a book as only a man living the most uneventful of lives, withdrawn from the world and spent in contemplation, could have written. It is said that it has been translated into more languages than any other book except the Bible. He died in 1471.

Kempton Park, in Middlesex, England, 4 miles W. of Kingston-on-Thames, once a royal residence, now noted for its race meetings.

Ken, or **Kiun,** an Egyptian goddess similar to the Roman Venus; she is represented as standing on a lion and holding two serpents in one hand and a flower in the other.

Ken, Thomas, an English prelate; born in Little Berkhampstead, Hertfordshire, England, in July, 1637. After studying at Oxford he became successively chaplain to the Princess of Orange, to the Earl of Dartmouth, and in 1684 to Charles II., who made him Bishop of Bath and Wells. In 1688 he was sent to the tower for resisting the dispensing power claimed by James II., and yet some months later he refused to take the oath of allegiance to William of Orange and was dispossessed of his see; but Queen Anne granted him a pension. His sermons and moral treatises have long been forgotten, but his morning and evening hymns are still cherished in many households. He died in Longleat, Wiltshire, March 19, 1711.

Kendal, or **Kirby Kendal,** a market-town of Westmoreland, England, on the Kent, 22 miles N. of Lancaster and 13 S. W. of Ambleside. It has an ancient Gothic church, a ruined castle (the birthplace of Catharine Parr), a town hall (1828), and a grammar school (rebuilt in 1887). The industries include heavy textile fabrics, such as horse-cloths and railway rugs, besides leather, snuff, paper, etc. Incorporated as a municipal borough in 1575.

Kendal, Mrs. (Madge Grimston), an English actress; born in Cleethorpes, Lincolnshire, England, March 15, 1849. She was known on the stage as Madge Robertson and made her first appearance in London, as Ophelia, in 1865. She soon gained a reputation as an excellent actress of high comedy. On her marriage to W. H. Grimston in 1869 she assumed with him the stage name of Kendal. Mr. and Mrs. Kendal made several visits to America after 1889 and secured favorable notice wherever they were seen. Mrs. Kendal was a sister of the dramatist T. W. Robertson.

Kendal, William Hunter, stage name of an English actor, William H. Grimston, who was born in London, Dec. 16, 1843. After his marriage to Madge Robertson (Aug. 7, 1869) he played leading parts with her. He commenced his career on the stage at Glasgow in 1862, where he remained till 1866, supporting such stars as Mr. and Mrs. Charles Kean, Helen Faucit, G. O. Brooks, etc.; made his first appearance in London at the Haymarket Theater in 1866, in "A Dangerous Friend," remained there five or six years, playing such parts as Charles Surface, Captain Absolute, Romeo, Orlando, Pygmalion, etc.; thence to Court Theater for couple of seasons; from there to Old Prince of Wales Theater for "Diplomacy," "London Assurance"; back to Court Theater for a season; then became lessee and manager, in partnership with John Hare, of St. James's Theater (1879–1888); producing there "The Queen's Shilling," "The Squire," "Impulse," "The Ironmaster," "A Scrap of Paper," "Lady of Lyons," "As You Like It," "William and Susan," "Ladies' Battle," etc.; toured with Mrs. Kendal in the United States and Canada, 1889–1895.

Kendall, Amos, an American statesman; born in Dunstable, Mass., in 1789. He was graduated at Dartmouth College in 1811; was admitted to the bar in 1814 and went to Kentucky where he practised law and edited a paper. In 1835 he was appointed Postmaster-General by President Jackson and was retained in the office by President Van Buren. He made great changes and improvements in the administration and workings of this office, relieved the postoffice from the debt which had so long encumbered it, and induced Congress to adopt a system which with but few alterations has been in effect ever since, and which made this department one of the strongest in the government. He retired from public life in 1840 and devoted the rest of his life to the duties of his profession. He died in Washington, D. C., Nov. 12, 1869.

Kendall, George Wilkins, an American writer; born in Mount Vernon, N. H., about 1809. He was founder of the New Orleans "Picayune," which became under his direction one of the leading journals of the South. He wrote "The War Between the United States and Mexico" (1851). He died in Oak Springs, Tex., Oct. 22, 1867.

Kendall, Henry Clarence, an Australian poet; born in Ulladalla district, New South Wales, 1841. While a lawyer's clerk in Sydney three poems were accepted by the London "Athenæum" in 1862; he then devoted himself to literature, publishing "Leaves from an Australian Forest" (1869) and "Songs from the Mountains" (1880), his chief works. Especially happy in description of Australian scenery, he is known as "the poet of the bush." He died near Sydney in 1882.

Kendrick, Ashael Clark, an American scholar; born in Poultney, Vt., Dec. 7, 1809. Besides bringing out translations and several text-books, and revising and editing Olshausen's "New Testament Commentary" and Meyer's "Commentary on John," he published "Our Poetical Favorites"; "Life and Letters of Emily C. Judson." He was one of the American committee of New Testament revisers. He died in Rochester, N. Y., Oct. 21, 1895.

Kenesaw Mountain, a mountain in Georgia 25 miles N. W. of Atlanta. It is famous as the scene of a battle in the Civil War between the Union troops under Sher-

man, and the Confederates under Johnston, which took place in June, 1864, and resulted in the repulse of Sherman with a loss of 3,000 men.

Kenia, Mount, an isolated mountain mass in Eastern Africa, about 10′ S. of the equator, and not far N. of Kilima-Njaro, nearly in the center of British East Africa. It is also known as Doenyo Ebor, or White Mountain, because its summit is covered with perpetual snow. The crater wall rises up to a height of 16,000 feet, but the loftiest pinnacle towers up 3,000 feet higher.

Kenilworth, a market-town of Warwickshire, England, on a small sub-affluent of the Avon. The castle, founded about 1120 by Geoffrey de Clinton, was defended for six months (1265–1266) by Simon de Montfort's son, and passed by marriage (1359) to John of Gaunt, and so to his son, Henry IV. It continued a crown possession till in 1563 Elizabeth conferred it on Leicester, who here in July 1575 entertained her for 18 days at a daily cost of $5,000—that sumptuous entertainment described in Scott's "Kenilworth." Dismantled by the Roundheads, the castle has belonged since the Restoration to the Earls of Clarendon. Its noble ruins comprise "Cæsar's Tower," the original Norman keep, with walls 16 feet thick; Mervyn's Tower and the Great Hall, both built by John of Gaunt; and the more recent but more dilapidated Leicester's Buildings. There is a fragment also of an Augustinian priory (1122); and the parish church has a good Norman doorway. Tanning is the chief industry. Pop. (1901) 4,544.

Kenlis. See KELLS.

Kennan, George, an American traveler; born in Norwalk, O., Feb. 16, 1845. In early life, and before the completion of the Atlantic cable, he was a member of the Western Union telegraph expedition to survey a route for a Bering Strait and Siberian telegraph line to Europe. The result of this expedition was the book called "Tent Life in Siberia" (1870). His journeys through Northern Russia and Siberia in the years 1885–1886 for the purpose of investigating the condition of the Siberian exiles resulted in the publication of a series of papers in the "Century Magazine" (1890–1891), afterward issued in book form under the title "Siberia and the Exile System" (1891). He was expelled from Russia in 1901. In 1902 he accompanied the American scientists who explored the crater of Mont Pelée, Martinique, after its frightful eruption.

Kennebec, a river of Maine, rises in Moosehead Lake, in the W. of the State, and, passing Augusta, runs generally S. to the Atlantic Ocean. It length is over 150 miles. It is navigable for large vessels to Bath, 12 miles, and for steamers beyond Augusta. In its course it falls 1,000 feet, affording abundant water power. Except for a few miles from its mouth, the river is closed by ice for from three to four months in the year; and many companies are engaged in harvesting and storing the ice.

Kennedy, Benjamin Hall, an English educator; born in 1804. He was graduated in 1827 as senior classic, senior Chancellor's medallist, and senior optime at St. John's College, Cambridge. Next year he became Fellow and classical lecturer of his college, in 1830 an assistant master at Harrow, and in 1836 was appointed to succeed his old master, Dr. Butler, at Shrewsbury. Here for 30 years he labored with assiduous vigor and conspicuous success, forming for almost a generation a series of brilliant scholars, The famous "Sabrinae Corolla" is a memorial at once of his own brilliant scholarship and of the spirit he could inspire. There never was perhaps a more dexterous and clever versifier in both Greek and Latin. In 1866 Dr. Kennedy was appointed Professor of Greek at Cambridge and Canon of Ely. He died in Torquay, April 6, 1889.

Kennedy, Crammond, an American lawyer; born in North Berwick, Scotland, Dec. 29, 1842; came to the United States in 1856; served as chaplain in the Civil War in 1861–1863; was associated with Henry Ward Beecher in 1869 in founding the "Christian Union," of which he became editor in 1870; admitted to the bar in 1878 and practised in New York and Washington, D. C. His publications include "Corn in the Blade" (poems, 1860); "Close Communion or Open Communion?" (1869); "The Liberty of the Press" (1876); etc.

Kennedy, Grace, an English novelist; born in Pinmore, Ayrshire, in 1782. Her best-known work was "Father Clement" (1823), which reached a 12th edition and was translated into nearly every European language. Her works were moral and religious in character. She died in Edinburgh in 1825.

Kennedy, John Pendleton, an American writer; born at Baltimore, Oct. 25, 1795. Best known by his very popular "Horse-shoe Robinson" (1835). Among his other works was a "Life of William Wirt, Attorney-General of the United States" (1849). Active in politics and several times member of Congress, he was Secretary of the Navy under President Fillmore. He died in Newport, Aug. 18, 1870.

Kennedy, Patrick, an Irish antiquarian; born in County Wexford in 1801. His studies were given to the archæology and popular traditions of Ireland. His chief work was "Legendary Fictions of the Irish Celts." He died in Dublin, March 28, 1873.

Kennedy, William, a Scotch writer; born near Paisley in 1799. He resided many

years in Galveston, Tex., serving there as British consul. He published: "My Early Days" (1826); "The Arrow and the Rose; with Other Poems" (1830); "The Rise, Progress, and Prospects of the Republic of Texas." He died near London in 1849.

Kennedy, William Sloane, an American clergyman; born in Muncy, Pa., June 3, 1822; was graduated at the Western Reserve College in 1846; studied theology and was ordained pastor of the Congregational Church in Brecksville, O. He was the author of "Messianic Prophecies" and "Life of Christ" (1852); "A History of the Plan of Union"; and "Sacred Analogies." He died July 30, 1861.

Kennet, White, an English clergyman; born in Dover in 1660. From 1718 till his death he occupied the episcopal see of Peterborough. In 1706 he brought out a complete "History of England" from the earliest times to the death of William III., a work of great accuracy and interest; and in 1713 "Bibliothecæ Americanæ Primordia," an attempt toward laying the foundation of an American library. He died in 1728.

Kenneth, the name of three Kings of Scotland who reigned in the dark ages of that country's history. KENNETH I. possessed the scepter only for one year, dying A. D. 605. KENNETH II. succeeded his father, Alpin, in 823, and died 854, after a long and successful war waged with the Picts. KENNETH III. ascended the throne on the death of his father, Malcolm, and was murdered by his soldiers and the populace in 994.

Kenney, Charles Lamb, an English writer, son of James; born in Bellevue, France, April 29, 1821. Was a friend of Thackeray and Dickens; secretary of De Lesseps. His book "The Gates of the East" (1857) turned English public opinion in favor of the Suez Canal, against Lord Palmerston's opposition. He introduced opera bouffe in London, writing librettos for "The Grand Duchess of Gérolstein," "La Belle Hélène," etc. He wrote also several popular songs, among them "Ever my Queen." He died in Kensington, Aug. 25, 1881.

Kenney, James, an English dramatist; born in Ireland in 1780. He was a bank clerk in London, with a taste for the theater, and wrote a number of pieces that still hold the stage. Among them were the farces "Raising the Wind" (1803); "Turn Him Out" (1812); "Love, Law, and Physic" (1812); the stock favorite "Sweethearts and Wives" (1823); and the famous tragedy "The Sicilian Vespers" (1840). He died July 25, 1840.

Kennicott, Benjamin, an English scholar; born in Totnes, Devonshire, England, April 4, 1718. The great work by which Kennicott's name will be remembered is his "Old Testament in Hebrew with Various Readings." In spite of considerable opposition from Bishops Warburton, Horne, and other divines, Kennicott succeeded in enlisting the sympathies and obtaining the support of the clergy generally. He died in Oxford, England, Sept. 18, 1783.

Kenny, Sir Edward, a Canadian statesman; born in County Kerry, Ireland, in 1800; removed to Halifax, N. S., in 1824, engaging in business there; was mayor of Halifax; member for 26 years of the legislative council of Nova Scotia, during 11 of which he was president; receiver-general of Canada 1869–1879; president of the privy council 1869–1870; senator 1867–1870; administrator of the government of Nova Scotia, and was knighted in 1870. He died in Halifax, May 16, 1891.

Kenosha, a city and county-seat of Kenosha co., Wis.; on Lake Michigan and the Chicago and Northwestern railroad; 35 miles S. of Milwaukee. It is a trade center for the county and a popular health and summer resort; is principally engaged in dairying, farming, and the manufacture of flour, leather, furniture, and carriages and wagons; and contains the University School (non-sect.); Kemper Hall School (P. E.), high school, public library, and a system of waterworks supplied from the lake and artesian wells. Kenosha has passenger and freight steamer communication with the principal ports on the Great Lakes. Pop. (1900) 11,606; (1910) 21,371.

Kenrick, Francis Patrick, an American clergyman; born in Dublin, Ireland, Dec. 3, 1797. He founded the seminary of St. Charles Borromeo in Philadelphia in 1832; became archbishop of Baltimore, 1851; honorary primate of the United States 1859. He was prominent as a controversialist and a Biblical scholar. Among his works were: "Dogmatic Theology" (4 vols. 1839–1840); "Moral Theology" (3 vols. 1841–1843). He also published a revision of the Douai English Bible, with notes. He died in Baltimore, Md., July 6, 1863.

Kenrick, Peter Richard, an American clergyman; born in Dublin, Ireland, Aug. 17, 1806; ordained priest in the Roman Catholic Church in 1830; came to the United States in 1833; appointed coadjutor to Bishop Rosati, of St. Louis, in 1841, and succeeded to that bishopric in 1843; was created first archbishop of St. Louis in 1847. His publications include "The Holy House of Loretto"; "Anglican Ordinations"; "Vaticana"; etc. He died in St. Louis, Mo., March 4, 1896.

Kensal Green, a cemetery on the N. W. of London, 77 acres in extent; consecrated in November, 1832. Here many of the illustrious sons of England have been buried, as Thackeray, Leigh Hunt, Sydney

Smith, Buckle, Sir Charles Eastlake, John Leech, Sir John Ross, Brunel, Mulready, Kemble, Dubdin, Tom Hood, Balfe, Liston, Charles Mathews, Madame Vestris, Tietjens, Wilkie Collins, the Duke of Sussex, and his sister, the Princess Sophia.

Kensett, John Frederick, an American painter; born in Cheshire, Conn., March 22, 1818. He spent the time from 1840 to 1847 in Europe, visiting and painting in France, Italy, England and other countries, and in 1849 was elected National Academician. He is best known by his admirable paintings of the White Mountains, Catskills, Adirondacks, etc. In 1859 he was appointed one of the commission to superintend the decoration of the capitol at Washington. Among his works are "Lake George," "Afternoon on the Connecticut Shore," "New Hampshire Scenery," "Italian Lake," etc. He died in New York, Dec. 16, 1872.

Kensington, a district in the W. of London adjoining Westminster, within which, are Kensington Palace and Gardens.

South Kensington Museum was at first a temporary edifice of iron and wood (popularly known as "the Brompton Boilers"). It was opened in 1857, and to it were removed various collections which had since 1852 been exhibited in Marlborough House. This edifice has been superseded by permanent buildings. The institution comprises (1) the Art Museum, (2) the India Museum, (3) various science collections.

Kent, Duke of, 4th son of George III., and father of Queen Victoria; born in Buckingham Palace, London, Nov. 2, 1767; married Victoria Mary Louisa, May 28, 1818; died in Sidmouth, Devonshire, England, Jan. 23, 1820. See VICTORIA.

Kent, Jacob F., an American soldier; born in Philadelphia, Pa., Sept. 14, 1835; entered the army as 2d lieutenant of the 3d United States Infantry, May 6, 1861. Was promoted 1st lieutenant July 31, 1861; captain Jan. 8, 1864; brevetted lieutenant-colonel, May 12, 1864, for gallant and meritorious services in the battle of Spottsylvania, Va.; brevetted colonel of volunteers, Oct. 19, 1864, for faithful and meritorious services in the field during the campaign before Richmond. When the war with Spain began he was colonel of the 24th Infantry. He was made Major-General of volunteers, July 8, 1898, and served with distinction in Cuba and, afterward in the Philippines. He was retired Oct. 15, 1898.

Kent, James, an American jurist; born in Philippi, N. Y., July 31, 1763. Author of the famous "Commentaries on American Law" (4 vols. 1826–1830), which holds in this country a position similar to that occupied by Blackstone's "Commentaries" in Great Britain. It contains not only federal jurisprudence, but the municipal law, written and unwritten, of the several States; has proved its general interest and special value by years of use; passed through many editions, and is one of the intellectual monuments of our country. He was chief-justice and chancellor of the State of New York. He died in New York, Dec. 12, 1847.

Kent, William, an English landscape gardener; born in Yorkshire, England, in 1685. He was originally a coach painter, but left that occupation to study the principles of design, for which purpose he went to Rome, where he studied under Luti. As a painter, however, he never attained celebrity; his talent lay more in ornamental architecture. But it is as the inventor of the modern style of landscape gardening that he is chiefly known; he broke up the old uniformity of straight lines and corresponding parts, and threw wood, water and ground into the beautiful shapes presented by nature, rendering that graceful, pleasing and attractive which before was stiff and formal. He died in 1748.

Kent, William Charles Mark, an English writer; born in London, England, in 1823. He produced a number of works in prose and verse, besides contributing to the "Encyclopædia Britannica" and several of the best English reviews, and being active as a journalist. His poem "Aletheia, or the Condemnation of Mythology" (1850) was praised by Lamartine. Among his prose works may be mentioned "The Vision of Cagliostro" (1863). "The Derby Ministry," under the pseudonym "Mark Rochester," and "The Gladstone Government," sketches of prominent political personages. He died Feb. 23, 1902.

Kentish Glory, a beautiful moth, orange-brown with black and white markings, the expansion of the wings about two and a half inches. The larva, which is not hairy, is whitish-green, feeding on birch in July and August; the perfect insect appears in April.

Kentish Rag, a calcareous rock belonging to the Lower Cretaceous series. In the S. E. of England it is 60 or 80 feet thick. It is of marine origin. It was in a quarry of Kentish rag at Maidstone that the great *Iguanodon mantelli* was discovered

Kent Island, an island some 15 miles long in Chesapeake Bay, Md., 7 miles E. of Annapolis. It was here the first settlement in Maryland was made by William Claiborne in 1631.

Kentucky, a river of Kentucky, formed by two forks which rise in the Cumberland Mountains, and, after a winding N. W. course of about 250 miles, enters the Ohio, 12 miles above Madison, Ind. The river runs through part of its course between perpendicular lime tone walls. It is navigable by steamboat beyond Frankfort.

Kentucky

Kentucky, a State in the South Central Division of the North American Union; bounded by Illinois, Indiana, Ohio, West Virginia, Virginia, Tennessee, and Missouri; area, 40,000 square miles; admitted to the Union, June 1, 1792; number of counties, 119; pop. (1890) 1,858,635; (1900) 2,147,174; (1910) 2,289,095; capital, Frankfort.

Topography.—The surface of the State is in general a plateau, sloping from the mountains in the E. to the rivers on the N. and N. W. The mountains in the S. E., the Cumberland and the Pine, run parallel and include the valley of the Cumberland river. This valley is 75 miles in length, 15 miles in width and has an elevation of 1,000 to 1,500 feet above sea-level. The mountain peaks bounding the valley often reach a height of 2,500 feet and give it more picturesque beauty than in any other part of the Appalachian system. The Mississippi, Ohio, and Big Sandy rivers form over one-half the boundary line of Kentucky, and besides these the Licking, Kentucky, Salt, and Green lie entirely within the State. The Tennessee and Cumberland rivers rise in Virginia and Kentucky respectively, the Tennessee running through Tennessee and Alabama, and the Cumberland through Tennessee alone; enter the State and cross it in parallel courses and empty into the Ohio within 15 miles of each other. These rivers are all navigable.

Geology.—The principal geological formations of the State are the Upper and Lower Silurian, Devonian, and sub-Carboniferous, with extensive coal measures. The entire State was at one time a great Lower Silurian lake, which has been pushed up by some subterranean force to a position 5,000 feet above that which it originally occupied. The sub-Carboniferous limestone areas in the Green river region contain numerous gigantic caverns, of which MAMMOTH CAVE (*q. v.*) is the largest.

Mineralogy.— The principal mineral resource of the State is coal. There are two great coal fields, one of 12,000 square miles in the E. and one of 4,000 square miles in the W. In 1899 the most valuable mineral products were coal, 4,608,255 short tons, valued at $3,618,222; coke, 81,095 short tons, valued at $161,454; limestone, valued at $178,861; sandstone, valued at $119,982; natural gas, valued at $125,745; petroleum, 18,280 barrels; bituminous sandstone, 2,015 short tons, valued at $10,575; and clay, valued at $20,191. In 1900 there were 4 mineral springs with an output of 272,000 gallons, valued at $10,250. Extensive mines of fluorspar are worked in Crittenden and Livingston counties.

Soil.—The soil is as a rule exceedingly rich and fertile, especially in that part known as the Blue Grass section, an area of over 10,000 square miles. The fertility of this region is due to the constant decay of a rich sub-stratum of lower Silurian limestone. It is said that there are not over 200 square miles of irreclaimable land in the entire State. There are quite extensive forests in the mountain regions. The principal trees are the ash, elm, pine, tulip, hickory, sweet gum, black walnut, maple, oak, honey locust, cottonwood, pecan, catalpa, cypress, apple, and beech.

Agriculture.—The great fertility of the river bottoms and the Blue Grass section makes Kentucky one of the foremost agricultural States in the Union. In 1900 the principal crops reported were corn, 69,267,224 bushels, valued at $27,706,890; wheat, 12,442,846 bushels, valued at $3,585,564; oats, 9,309,293 bushels, valued at $2,885,881; hay, 390,064 tons, valued at $4,427,226; potatoes, 2,807,490 bushels, valued at $1,403,745; rye, 294,593 bushels, valued at $185,594; barley, 37,523 bushels, valued at $20,638; and tobacco (leaf) crop grown, 1899, 149,052,926 pounds. In 1899 the farm animals reported were horses, 350,978, valued at $13,879,085; mules, 96,958, valued at $4,390,251; sheep, 549,832, valued at $1,656,094; milch cows, 235,798, valued at $6,425,496; and other cattle, 303,651, valued at $7,446,740.

Manufactures.—According to the United States census of 1900 there were 9,560 manufacturing establishments, employing $104,070,791 capital and 68,041 persons; paying $22,434,185 for wages and $82,773,415 for materials used; and having products valued at $154,605,115. The principal industries were in connection with tobacco, liquors, flour and grist mill products, lumber and timber products, iron and steel, slaughtering and meat packing, and foundry and machine-shop products.

Liquors and Tobacco.—The internal revenue reports for the fiscal year ending June 30, 1900, showed the production of various spirits as follows: Bourbon whiskey, 12,936,558 gallons; rye whiskey, 1,111,098 gallons; rum, 168,968 gallons; gin, 1,659 gallons; alcohol, 8,184 gallons; and miscellaneous liquors, 841,823 gallons. The manufactured tobacco production in 1899 amounted to 40,157,712 pounds, on which $4,704,551 was paid for revenue stamps.

Banking.— On Oct. 31, 1901, there were 85 National banks in operation, with $12,958,710 in capital, $10,368,213 in outstanding circulation, and $9,289,000 in United States bonds. There were also 237 State and private banks, with $10,087,425 capital, and $2,256,425 surplus; and 16 trust and loan companies, with $4,187,292 capital and $1,067,298 surplus. In the year ending Sept. 30, 1901, the exchanges at the United States clearing house at Louisville and Lexington

KENTUCKY AND TENNESSEE

SCALE OF MILES
10 0 10 20 30 40 50 60
State Capitals ⊛ County Seats ⊙

Hammond's 8 x 11 Map of Kentucky and Tennessee
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A 90° B 89° C 88° D 87° E Longitude West

86°
F
85°
G
84°
H
83°
J
O H I O
I N D I A N A
W. V I R G I N I A
K E N T U C K Y
V I R G I N I A
T E N N E S S E E
G E O R G I A
N. C A R.
COVINGTON
CINCINNATI
NEWPORT
Dayton
Columbus
Westport
N. Vernon
Vernon
Seymour
Versailles
Risingsun
Madison
Scottsburg
New Albany
LOUISVILLE
Maysville
Portsmouth
Ashland
Catlettsburg
Huntington
Gallipolis
Pt. Pleasant
Pomeroy
Jackson
Waverly
McArthur
Hillsboro
Georgetown
Frankfort
LEXINGTON
Paris
Winchester
Mt. Sterling
Cynthiana
Richmond
Harrodsburg
Danville
Lebanon
Bardstown
Shelbyville
Elizabeth T.
Hodgensville
Campbellsville
Columbia
Somerset
London
Glasgow
Burkesville
Albany
Monticello
Williamsburg
Barboursville
Middlesboro
Pineville
Harlan
Hazard
Whitesburg
Hyden
Jackson
Beattyville
Booneville
Manchester
Prestonsburg
Paintsville
Pikeville
Louisa
Grayson
Greenup
Flemingsburg
Morehead
Owingsville
West Liberty
Salyersville
Hindman
Norton
Wise
Gate City
Jonesville
Bristol
Cumberland Gap
Tazewell
Sneedville
Rogersville
Morristown
Greeneville
Jonesboro
Johnson City
Elizabethton
Erwin
KNOXVILLE
Maryville
Sevierville
Newport
Dandrige
Clinton
Harriman
Kingston
Loudon
Madisonville
Athens
Cleveland
CHATTANOOGA
Dayton
Pikeville
Jasper
McMinnville
Sparta
Crossville
Cookeville
Livingston
Jamestown
Huntsville
Jacksboro
Wartburg
Celina
Gainesboro
Carthage
Smithville
Tracy City
Whitwell
Sequatchie
Benton
Ducktown
Murphy
Bryson City
Robbinsville
Hayesville
Blairsville
Blueridge
Ringgold
Dalton
Trenton
Lafayette
Springplace
Elljay
Bridgeport
Stevenson
Marshall
GREAT SMOKY MTS.
Cumberland R.
Tennessee R.
Clinch R.
Big Sandy R.
Ohio R.
1
2
5
6
39°
38°
37°
36°
35°
86° Greenwich
82°
36°
NORTHEASTERN PORTION OF TENNESSEE
Same Scale as Main Map

aggregated $480,595,304, an increase over the previous year of $29,995,753.

Education.—In 1897 the school population was 660,500; enrollment in public schools, 501,893; and average daily attendance, 308,697. There were 7,989 public school buildings, 9,960 teachers; public school property valued at $5,448,814; receipts of the year, $2,753,664; and expenditures, $2,650,190. For higher education there were 69 public high schools, 82 private secondary schools, 6 public and 8 private normal schools, 13 colleges and universities for men and for both sexes, and 11 colleges for women. Among the colleges and universities the most noted are Central University at Richmond, Berea College at Berea, Kentucky University at Lexington, Georgetown College at Georgetown, Center College at Danville, and the Agricultural and Mechanical College of Kentucky at Lexington. Among the women's colleges are Potter College at Bowling Green, Hamilton Female College at Lexington, Caldwell College at Danville, and Jessamine Female Institute at Nicholasville.

Churches.—The strongest denominations in the State are the Regular Baptist, South; Roman Catholic; Methodist Episcopal, South; Disciples of Christ; Regular Baptist, colored; Methodist Episcopal; African Methodist; and Presbyterian, South. In 1899 there were 3,389 Evangelical Sunday-schools, with 25,782 officers and teachers and 223,332 scholars.

Railroads.—The total length of railroads within the State, Jan. 1, 1901, was 3,127 miles, of which 33½ miles were constructed during the previous year. The assessed valuation of railroad property in 1899 was $46,027,613.

Postoffices and Periodicals.—In 1901 there were 3,023 postoffices of all grades, and 320 periodicals, of which 28 were daily, 1 tri-weekly, 18 semi-weekly, 239 weekly, 7 semi-monthly, 24 monthly, 1 bi-monthly, and 2 quarterly.

Finances.—The assessed valuation of all taxable property in 1899 was $609,356,299; of which $447,631,753 was real estate; and $115,646,933 personal property. The total bonded debt Jan. 1, 1901, was $1,000,000; and sinking funds, $754,019.

State Government.—The governor is elected for a term of four years and receives a salary of $6,500 per annum. Legislative sessions are held biennially, and are limited to 60 days each. The Legislature has 38 members in the Senate and 100 in the House, each of whom receives $5 per day and mileage. There are 11 representatives in Congress. The State government in 1904 was Democratic.

History.—With the earliest history of Kentucky is associated the name of Daniel Boone, whose exploits in hunting and Indian fighting in the then distant and unexplored wilderness dates as far back as 1769. He founded Boonesborough in 1775, and Harrodsburg being settled about the same time, these two towns are, with the exception of the French settlements, the oldest in the West. Soon after Kentucky was made a county of Virginia, and the first court held at Harrodsburg in 1777. In 1790 Kentucky became a separate territory, and in 1792 was admitted into the Union. Since then, with the exception of the Civil War, its progress has been very rapid. J. C. W. BECKHAM.

Kentucky, The, a battleship of the United States navy, launched with her sister-ship, the "Kearsarge," at Newport News, March 24, 1898. These two new battleships are alike in every particular. For an account of their dimensions, armament, etc., see KEARSARGE, THE.

Kentucky Resolutions, a series of nine resolutions introduced into the Kentucky Legislature in 1798, by George Nicholas, though it was afterward known that Thomas Jefferson was the author of them. They were directed against the Alien and Sedition laws, and against acts passed to punish frauds on the Bank of the United States, and emphasized the rights of the several States. Another resolution was added in 1799.

Kentucky, State University of, a co-educational, non-sectarian institution in Lexington, Ky.; chartered in 1865, and opened in 1866 as an agricultural and mechanical college; changed to its present form in 1878; has grounds and buildings valued at over $870,000; endowment, about $170,000; scientific apparatus, etc., $95,000; volumes in the library, about 7,500; ordinary income, $150,000; faculty, 60; students, 770.

Kenyon College, an educational institution in Gambier, O.; founded in 1825 under the auspices of the Protestant Episcopal Church; has grounds and buildings valued at over $430,000; endowment funds aggregating $600,000; volumes in the library, about 40,000; scholarships, 16; ordinary annual income, about $50,000; average number of faculty, 22; average student attendance, 145; graduates, over 2,000.

Keokuk, a city in Lee co., Ia.; near the confluence of the Mississippi and Des Moines rivers and on the Burlington Route, the Chicago, Rock Island, and Pacific, and other important railroads; 46 miles S. of Burlington. The city lies at the foot of the lower rapids, which are skirted by a ship canal 11 miles long, constructed by the Federal government. It has a very large river commerce and extensive manufactures, including foundry products, boots and shoes, canned goods, overalls and shirts,

brick and tile, machinery, packed pork, and pickles, the latter plant being probably the largest in the country. Among the notable institutions are the Keokuk Medical College, College of Physicians and Surgeons, Keokuk Dental College, St. Vincent's Academy (R. C.), St. Peter's Boys' School (R. C.), St. Joseph's and Mercy Hospitals, the Home for the Friendless, United States government building, and several libraries. The city is also the seat of the general offices of the Keokuk and Western railroad. Pop. (1900) 14,641; (1910) 14,008.

Kephallenia. See CEPHALONIA.

Kepler, or **Keppler, Johann,** a German astronomer; born in Weil der Stadt, Würtemberg, Dec. 27, 1571. He was left to his own resources when a mere child, his education depending on his admission into the convent of Maulbronn. He afterward studied at the University of Tübingen, applying himself chiefly to mathematics and astronomy. In 1593 he was appointed Professor of Mathematics at Gratz, and about 1596 began a correspondence with Tycho Brahé, which resulted in his going to Prague in 1599 to aid Tycho in his work. Tycho obtained for him a government appointment, but the salary was not paid, and Kepler lived for 11 years there in great poverty. He then obtained a mathematical appointment at Linz, and 15 years afterward was removed to the University of Rostock, poverty still pursuing him. In his "Mystery" (1596), he proclaims that five kinds of regular polyhedral bodies govern the five planetary orbits. Yet after publication he still continued to "brood," becoming at length convinced that this theory was only an error, till after 22 years of patient study and numberless speculative failures, he was able at last to announce in his "Harmonies of the World" (1619) that the "square of a planet's periodic time is proportional to the cube of its mean distance from the sun." This rule is known as Kepler's Third Law. He saw clearly enough that it implies that the planets are moved by a force greater near the sun, and lessening with distance, but he did not grasp, as Newton after him did, the truth that this is an attractive force constantly acting toward the sun, nor could he therefore guess the law of its action. Finding the theory of epicycles unable to bear the strain of Tycho Brahé's accurate observations, especially in the case of the planet Mars, he endeavored to find a law for the planet's movements which would be simple and satisfactory. After enormous labor, and by a process of trial and error, he found that (1) the planet's orbit was an ellipse, of which the sun is in one focus, and (2) that, as the planet describes its orbit, its radius vector traverses equal areas in equal times. These rules (published in 1609 in his work on the "Motions of Mars" are known as Kepler's First and Second Laws respectively. These laws formed the ground-work of Newton's discoveries, and are the starting-point of modern astronomy. Besides, we owe to Kepler many discoveries in optics, general physics, and geometry. He died in Ratisbon, Nov. 15, 1630.

Keppel, Augustus, Viscount, an English naval officer; born April 2, 1725. Entering the navy, he served under Hawke in 1757, captured Goree in 1758, took part in the battle of Quiberon Bay in 1759, and in the capture of Belleisle in 1761, and commanded at the capture of Havana in 1762. In 1778 he encountered the French fleet; a sharp but indecisive action ensued, but owing to a disagreement between Keppel and Sir Hugh Palliser, his second in command, the French were suffered to escape without a renewal of the combat. Both admirals were brought before a court-martial, but both were acquitted. The affair made a great stir in England, the popular verdict being on the side of Keppel. In 1782, in which year he was created Viscount Keppel of Elveden in Suffolk, he became First Lord of the Admiralty, but resigned on Pitt's accession to government. Keppel died, unmarried, Oct. 3, 1786.

Keramics. See POTTERY.

Keratin, a term applied to the substance which forms the chief constituent of hair, feathers, nails, claws, horns, and the epidermis and epithelium of the higher animals. In consequence of its insolubility in alcohol, water, acetic acid, boiling dilute hydrochloric acid, and dilute sodic hydrate, it is easily obtained pure. It dissolves in boiling acetic acid and in strong alkalies, and when boiled with sulphuric acid it decomposes with formation of leucine and tyrosine.

Keratitis, inflammation of the cornea, with congestion of the conjunctiva and sclerotic coat of the eye, which may go on to infiltration by pus, and destruction of the sight by ulceration. Three forms are found — viz., syphilitic, strumous or scrofulous ophthalmia, and pustular corneitis. Keratitis, when associated with suppuration, as in smallpox, and other affections, is called onyx, from its resemblance to the lunula of the nail. Perforation into the anterior chamber, causing hypopion, sometimes happens, when pus or shreds of lymph accumulate there, or its inward perforation may cause iritis.

Keratonyxis, a term applied by the German surgeons to the operation of couching, performed by introducing a needle into the cornea or horny coat of the eye, and depressing or breaking the opaque lens.

Keratry, Comte Emile de, a French politician and author; born in Paris, France,

March 20, 1832; served as a volunteer in the Crimean War; as a French guerilla in Mexico (1863–1865) and, on his return, bitterly attacked the war office on its conduct of the war and its treatment of Maximilian. His accusation aroused intense interest, and he was elected (1869) opposition deputy to the Chamber of Deputies. During the war of 1870, as General of Division, he organized over 50 battalions in Brittany, but resigned owing to disagreements with the war office, and wrote a severe arraignment of both naval and military authorities. He was prefect of Toulouse and of Marseilles (1871–1872), and in the same years became a member and commander of the Legion of Honor. He wrote "Heraldic War" (1860, comedy); "Club Life" (1862, drama); various pamphlets on the Mexican expedition, etc.

Kerbela, a town and holy place in Asiatic Turkey; 60 miles S. W. of Bagdad. The pilgrims number at least 200,000 annually. The sanctity of Kerbela arises from the fact that it is built on the site of the battlefield on which Hussein, son of Ali and Fatima, lost his life (680) in attempting to maintain his right of succession to the califate. Every Shiite Moslem throughout the world who can afford it seeks sepulture in the holy ground. The number of dead Moslems conveyed from Bombay alone is considerable.

Kereli Gol. See Beg-Shéhr.

Keren, a Hebrew trumpet. The word is sometimes used in the Bible as synonymous with *shophar*, and to it is sometimes affixed *jobel*, rendered in the English version ram's horns.

Kerguelen's Land, or **Desolation Island,** an island of volcanic origin, in the Antarctic Ocean. The surface is mountainous (Mount Ross, 6,120 feet), and most of the interior is covered with an ice sheet and its glaciers. Numerous islands and rocks encircle the coasts. The shores are very irregular, long fjords penetrating far inland and forming good harbors. The climate is raw, and storms are nearly constant. The island was discovered in 1772 by a Breton sailor, Kerguelen-Trémarec, and was visited by Captain Cook (who christened it Desolation Island) in 1776, by the "Challenger" in 1874, and by English, American, and German expeditions to observe the transit of Venus in the same year.

Kerguelen's Land Cabbage, the only known species of a very curious genus of plants of the natural order *cruciferæ*, found only in Kerguelen's Land. It has a long, stout, perennial root stock, and a bolled head of leaves very similar to those of the common garden cabbage. Captain Cook first discovered this plant and directed attention to it. The root stocks have the flavor of horse radish. The dense white heart of the cluster of leaves tastes like mustard and cress, but is coarser. The whole foliage abounds in a very pungent pale yellow essential oil, which is confined in vessels that run parallel to the veins of the leaf. The Kerguelen's Land cabbage is used by voyagers, boiled either by itself, or with beef, pork, etc., chiefly on account of its antiscorbutic qualities.

Keri-chetib (ker'ē-ket'ib), a term applied, in philology, to various readings in the Hebrew Bible. The signification of *keri* is, that which is read; while *chetib* means that which is written. When instances of such readings occur, the *chetib* or false reading, is placed in the text, while the *keri*, or true reading, is placed in the margin with a Hebrew character under it. The number of *keri-chetibs* is estimated at a thousand, and most of them are attributed to Ezra; but as several corrections of this kind appear in his own writings, it is probable that many were made at some subsequent period.

Kerite, a compound invented by Austin C. Day, and by him termed kerite or artificial caoutchouc, and in which the raw caoutchouc or rubber is replaced by tar or asphaltum, which, combined with animal or vegetable oils, is vulcanized by sulphur, the product closely resembling rubber, the hard and soft varieties being produced by different proportions, etc. The principal use of kerite has been as an insulating material in telegraphy.

Kerkenna Islands, a group of islands in the Gulf of Cabes, E. of Tunis.

Kerki, a town belonging formerly to Bokhara, Central Asia, about 120 miles S. of Bokhara city, on the left bank of the Amu-Daria or Oxus. An important place both commercially and strategically, it is the halting place of the caravans trading from Bokhara to Herat, and stands near the chief ferry over the Oxus. The fortress, consisting of a high mud wall flanked by bastions, was in 1885 strengthened by Russia, who in May, 1887, garrisoned it with regular troops.

Kermadec Islands, a group of volcanic islands in the Pacific Ocean, 700 miles N. E. of Auckland, New Zealand. It consists of four principal islands — Raoul or Sunday (7,200 acres), Macaulay (756 acres), Curtis, and L'Esperance — and several smaller islands. The climate resembles that of New Zealand. The group was discovered in 1788, and annexed by Great Britain in 1886.

Kerman, or **Karman** (ancient Carmania), one of the E. provinces of Persia, S. of Khorasan, and having an area of about 59,000 square miles. The N. and N. E. are

occupied by a frightful salt waste called the Desert of Kerman, which forms a part of the great central desert of Iran. On this extensive tract not a blade of grass is to be seen. The S. portion, although mountainous, is equally arid and barren with the N., except the small tract of Nûrmanshir, toward the E., which is fertile and well watered. Roses are cultivated for the manufacture of attar of roses; silk and various gums are exported. The inhabitants, who number about 300,000, are chiefly Persians proper; the rest are Guebres or Parsees, Belûchis, and other wandering tribes.

Kerman, the chief town, is near the middle of the province, in the central mountain range, and contains a population estimated at 30,000. The trade, though still considerable, is very small compared with what it was during the 18th century, when Kerman was the great emporium for the trade by the Persian Gulf and the Indian Ocean. In 1722 the town was destroyed by the Afghans; in 1794 it was taken and pillaged by Aga Mohammed, and 30,000 of the inhabitants made slaves. But the chief cause of the decline of its trade was the fall of Gombroon, its port, before the rising prosperity of Bushire. At present Kerman is only noted for the manufacture of the famous Kerman carpets (a sort of woolen rugs), felts, and brass cups.

Kermanji. See KURDISTAN.

Kermanshah, Karmanshah, or Kirmanshahan, a town of Persia, capital of Persian Kurdistan, near the right bank of the Kerkhah river. It is the center of converging routes from Bagdad, Teheran, and Ispahan. Its commerce is considerable, and there are manufactures of carpets and weapons. Between Kermanshah and Teheran the country is mountainous. Pop. 30,000.

Kermes, a dyestuff obtained from an insect. The name is also given to a cherry-red mineral, usually in tufts of capillary crystals; a mixture of sesquioxide and sesquisulphide of antimony; approximate composition $(Sb_2S_3)_2Sb_2O_3$. It was formerly much used for the same purposes as James's powder.

Kermes Mineral, amorphous antimony trisulphide, a brown-red powder used in the preparation of artists' colors.

Kermess, Kirmess, or Kermis, a Church festival held originally by the Dutch and in Flanders, and later in other parts of Europe, on the feast-day of the principal saint of a place or church. It was observed by an annual fair, at which the amusements were dancing, feasting, target-shooting and other performances, sometimes carried to excess. In the United States the word has come into use for entertainments given for charitable purposes.

Kernahan, Coulson, an English writer; born in Ilfracombe, Aug. 1, 1858. His poetry is strong in matter and finished in form. Some of his novels are marked by a play of gloomy fancy not unlike Hawthorne's. The striking story "A Dead Man's Diary," published anonymously, soon reached a fourth edition. Two others, "Stranger than Fiction" and "Dead Faces" were notable.

Kerner, Andreas Justinus, a German poet; one of the leading members of the "Swabian School"; born in Ludwigsburg, Würtemberg, Sept 18, 1786. He studied at Maulbronn and Tübingen, and settled in 1818 as a physician at Wildbad, and finally at Weinsberg. His poetry is noted for freshness and simplicity, and is lit up with gleams of humor. He took a keen interest in the phenomena of animal magnetism, and wrote several books on the subject, one of which "The Seer of Prevorst" excited great attention. He died in Weinsberg, Feb. 21, 1862.

Kerosene, a name given to the principal product of the distillation of petroleum, the crude domestic oil yielding 70 per cent. of its weight. It is also obtained from bituminous shale. It is colorless oil, possessing a characteristic taste and smell; insoluble in water, moderately soluble in alcohol, but very soluble in ether, chloroform, and benzene. It dissolves camphor, iodine, phosphorus, sulphur, fats, wax, and many resins. The flashing point of a safe kerosene should not be less than 34°, and the igniting point 43°. The finest quality of illuminating oil is produced from distillates ranging in specific gravity from 0.775 to 0.780. It has a high flashing point, 48° to 60°, and contains none of the lighter parts of the crude oil. A good illuminating oil should neither be too viscous nor too volatile, and it should not take fire when a light is applied to it.

Kerowli, the chief town of the native State of the same name in Rajputana, India, 80 miles S. W. of Agra. It was founded in 1348; is surrounded by a sandstone wall; and contains a beautiful palace and a temple of Krishna which attract many pilgrims.

Kerr, Orpheus C. See NEWELL, ROBERT HENRY.

Kersanton, the name given to several varieties of igneous rock which are rich in plagioclase felspar and dark mica, and contain carbonates. They occur in the form of dykes traversing the Palæozoic rocks of Brittany. The name is from Kerzanton, a small hamlet on the Brest Roads. Granular varieties of kersanton are called kersantite, while those which have a marked porphyritic structure are known as mica porphyrites.

Kersey, a variety of woolen cloth, differing from ordinary broadcloth by being

woven as a twill. It is easily distinguished from the common cloth by the diagonal ribbed appearance of its upper side, where the nap, not being raised, allows its structure to be seen. A very thin fine make of kersey is called cassimere.

Kershaw, Joseph Brevard, an American military officer; born in Camden, S. C., Jan. 5, 1822; at the outbreak of the Civil War entered the Confederate army, commanding the 2d South Carolina regiment, raised mainly by himself, at Bull Run, in July, 1861; as Brigadier-General commanded a brigade in the Peninsular Campaign of 1862; took part in the second battle of Bull Run; in the capture of Harper's Ferry, Sept. 15, 1862; at Antietam; at Fredericksburg; at Chancellorsville; at Gettysburg; at Chickamauga; the siege of Knoxville; as Major-General commanded a division of Lee's army in 1864; became judge of the 5th Circuit of South Carolina in 1877. He died in Camden, S. C., April 13, 1894.

Kertch, a seaport in Russia, on the Strait of Kaffa, or Yenikale, and previous to 1855 the most important port of the Crimea. It has had an eventful history and is noted for its antiquities. The town occupies the site of the ancient Panticapæum, the seat of the Bosphorian kings and once the residence of Mithridates. It was later occupied by the Byzantine empire, Turks, etc., and was turned over to Russia in 1744. It was sacked by the French and English forces in 1855. It has an excellent harbor, and exports salt and hides. Pop. about 13,000.

Kervyn de Lettenhove, Josef Marie Bruno Konstantin (ker-van' de let'en-hove), a Belgian historian; born in St. Michel, West Flanders, Aug. 17, 1817. His principal work was "History of Flanders." Among his other works are "The Huguenots," "Marie Stuart." He died in Brussels, April 3, 1891.

Kesora (kes-o'rä), the female idol adored in the temple of Juggernaut. Its head and body are of sandalwood, its eyes two diamonds, and a third diamond is suspended round its neck; its hands are made entirely of small pearls; its bracelets are of pearls and rubies, and its robe is cloth of gold.

Kestrel, a raptorial bird; above, red spotted with black; beneath, fawn spotted with black; the head and tail of the male ashy-blue. Length of both sexes about 12½ inches. The kestrel when hunting for prey suspends itself in the air by a constant motion of its wings; it is, therefore, sometimes called the windhover. It feeds on mice, insects, and occasionally birds, and is a useful bird to the agriculturist, though game keepers, confounding it with the sparrow hawk, kill it when they can. It is a European bird, but migrates in winter to India and Africa. It occurs also in Borneo, China, and Japan. It builds in towers and old buildings, laying four to six eggs, white or reddish with red blotches. More than 20 species are known. They resemble hawks, but have the toes shorter.

Keswick Lake. See DERWENTWATER.

Ketch, a two-masted vessel of the galliot type, usually from 100 to 250 tons burden. Ketches were formerly often used as yachts, also as bomb-vessels.

Ketchup, or **Catsup,** said to be derived from the Japanese *kitjap*, a pungent sauce first introduced from the East, and employed as a seasoning for gravies, meat, and fish. It was formerly prepared from mushrooms only, but numerous other products are now used for the same purpose. The best ketchup is obtained from mushrooms, walnuts, and tomatoes; instructions for its preparation may be found in almost every cookery-book.

Ketones. See ACETONES.

Ketteler, Wilhelm Emanuel von (ket'-e-ler), a German prelate; born in Münster, Dec. 25, 1811. One of the ablest of German ultramontanists; Bishop of Mentz (1850), for which diocese he obtained special privileges; and member of the first Reichstag (1871). He wrote on the questions of the day. Among his works are: "Freedom, Authority, and Church"; "The Labor Question and Christianity," which even Lassalle praised; "Germany after the War of 1866." He died in Burghausen, Bavaria, July 13, 1877.

Kettell, Samuel, an American writer; born in Newburyport, Mass., Aug. 5, 1800. He assisted Samuel G. Goodrich in the preparation of some of his "Peter Parley" books. Under the pen-names of "Peeping Tom" and "Timothy Titterwell" he contributed many humorous articles to the Boston "Courier," afterward becoming its editor. His principal works are: "Records of the Spanish Inquisition" (1828); and "Specimens of American Poetry, with Critical and Biographical Notices." He died in Malden, Mass., Dec. 3, 1855.

Kettle, Mary Rosa Stuart, pseudonym ROSA MACKENZIE KETTLE, an English novelist; born in Overseale, Leicestershire, England. She was popular through her stories of Cornwall and the South Coast. Her earliest success was "Fabian's Tower" (1852). She also published: "La Belle Marie: A Romance of the Cornish Coast" (1862); "Hillsden on the Moors" (1873); "My Home in the Shires" (1877); "The Sea and the Moor" (1877); "The Sisters of Ombersleigh; or Under the South Downs" (1888).

Kettle Drum, a musical instrument, so named from its resemblance to a hemispherical kettle. It is formed of thin copper, and has a head of parchment or vellum. Kettle drums are used in pairs, slung on each side of the withers of a cavalry horse. One drum is tuned to the key note, and the other to the fifth of the key in which the piece in which they are to be used is written. The tuning is by a hoop and screws. The best sticks for kettle drums are those having whalebone handles with a wooden button covered by a piece of sponge; by the use of these the finest gradations of tone may be gained. Kettle drums are said to have been introduced into the orchestra by Handel, who employed a pair taken as part of the spoil at the battle of Dettingen, in the score of the Te Deum written in celebration of that event. Also a name for a tea party held by fashionable people in the afternoon before dinner.

Keuka (or Crooked) Lake, a beautiful body of water in New York, bordered by thrifty vineyards, and stretching from Hammondsport, Steuben county, N. E. to Penn Yan, Yates county; extreme length, about 20 miles; average width, 1½ miles; elevation above sea-level, about 710 ft.; extreme depth, 200 ft.; discharges by an outlet into Seneca Lake.

Keuper (koi'per), the name given in Germany to a series of beds constituting the uppermost of the three series of strata from which the Trias derives its name. In Würtemberg it is about 1,000 feet thick. Alberti divides it into limestone, gypsum, and carbonaceous slate clay. Remains of reptiles — genera, *Nothosaurus* and *Phytosaurus* — have been found in it, the labyrinthodont order of amphibians, and fishes of the genera *Saurichthys* and *Gyrolepis*. The plant remains are ferns, equisetaceæ, cycads, etc. The Keuper is represented in England by saliferous and gypseous shales and marls, and in France by Marnes Irisées. The Keuper sandstones, especially the lower ones, afford good building stones. They are a pale red, yellow or white, and have been largely used in the cathedrals of Worcester and Chester.

Kew, a village in Surrey, England, 6 miles W. of Hyde Park Corner, and on the right bank of the Thames, which is here crossed by a fine stone bridge of seven arches. Foremost among objects of interest at Kew are the Royal Botanic Gardens and Arboretum, containing magnificent collections of plants and ferns, both native and exotic, and of trees and shrubs. Established in 1760 by the mother of George III., and made a national institution in 1840, the gardens now extend over 70 acres, and the arboretum 178 acres, and the annual cost of keeping them up amounts to about $100,000.

Kew Magnetometer, the best known portable instrument for measuring the horizontal force of the earth's magnetism; in general use by civil engineers all over the world; named from the Kew magnetic observatory, England, where first used.

Kew Observatory, an astronomical station in Old Richmond Park, between Kew and Richmond, Surrey, England. It was built by George III. as a private enterprise for the observation of the transit of Venus in 1769 and was then called the King's Observatory. It was transferred to the British Association as a physical observatory in 1841, and given its present name. In 1871 it was placed under the control of the Royal Society and is principally used as an institution for examining and testing meteorological and magnetic instruments, and for taking daily photographs of the sun.

Kewanee, a city in Henry co., Ill.; on the Burlington Route railroad; 32 miles N. E. of Galesburg. It is in a rich farming region and has a number of important manufactories, especially of tubing and pumps. Pop. (1900) 8,382; (1910) 9,307.

Keweenaw Bay, an arm of Lake Superior, N. of Michigan.

Keweenaw Point, a peninsula in Northern Michigan, projecting into Lake Superior. It is rich in copper mines.

Keweenaw Series, in geology, a group of rocks in the United States and Canada, chiefly sandstones, amygdaloids, conglomerates, and traps, belonging to the Algonkian age; greatest total thickness about 40,000 feet. They contain the famous copper deposits of the Lake Superior region.

Key, a portable instrument of metal for shooting the lock-bolt of a door; an instrument formed with cavities or interstices corresponding to the wards of a lock, by which the bolt is moved backward or forward. In music: (1) A mechanical contrivance for closing or opening ventages, as in flutes, clarinets, ophicleides, etc. By means of keys on such instruments, apertures too remote to be reached by the outstretched fingers are brought under control of the player. (2) A lever which brings the pallets of an organ under the control of the hand or foot of an organist. (3) A lever which controls the striking apparatus of a key-stringed instrument. In the harpsichord it acted on the jack; in the pianoforte it acts on the hammer. (4) The wrest or key used for tuning instruments having metal pegs. Its end is hollowed out so as to fit over the four-sided end of the peg, and the cross-bar with which it is surmounted gives leverage to the hand of the tuner, so that he is enabled to tighten or loosen a string, or (in the case of a drum) slacken or strain a parchment. (5) The sign placed at the commencement of the musical stave which shows the pitch of the

notes, was originally called a clavis or key. This sign is called in modern music a clef. (6) Key, in its modern sense, is the starting point of the definite series of sounds which form the recognized scale. Different starting points require the relative proportion of the steps of the scale to be maintained by means of sharps or flats in the signature. The key of C major requires no flats or sharps for this purpose, hence it is called the normal key.

Key, or **Ki,** a group of islands in the Indian Archipelago, about 50 miles W. of the Arru Islands and about 70 miles from the S. W. coast of New Guinea.

Key, Francis Scott, an American poet; born in Frederick co., Md., Aug. 9, 1780. He was a lawyer by profession and a brother-in-law of Chief Justice Taney. Being detained on one of the British ships during the bombardment of Fort McHenry, Sept. 14, 1814, he composed the words of "The Star-Spangled Banner." He died in Baltimore, Md., Jan. 11, 1843.

Key Board, the range of keys on a pianoforte or organ. Keys played by the fingers are called manuals; those by the feet are called pedals.

Keyes, Emerson Willard, an American financier; born in Jamestown, N. Y., June 30, 1828; was graduated from State Normal School, Albany, 1848; was teacher for several years; became deputy superintendent of public instruction 1857, and superintendent 1861; was deputy superintendent of the banking department of the State of New York from 1865 to 1870, and exercised great influence on the organization of the National banking system; wrote "History of Savings Banks in the United States" (1876) and "Code of Public Instruction of the State of New York." He died in Brooklyn, N. Y., Oct. 17, 1897.

Keyes, Erasmus Darwin, an American military officer; born in Brimfield, Mass., May 29, 1810; was graduated at the United States Military Academy in 1832; assigned to the 3d United States Artillery, and served in Charleston in 1832–1833; later was on duty in the Northwest; served in the Civil War, winning distinction at Fair Oaks and in other actions; promoted Major-General of volunteers May 5, 1862, and on May 31 of that year was brevetted Brigadier-General U. S. A.; resigned in 1864 and settled in California. He was the author of "Fifty Years' Observation of Men and Events" (1884); etc. He died in Nice, France, Oct. 11, 1895.

Keyne, St., a virgin said to have lived about 490, whose name survives in an old church in Cornwall near Liskeard, England, and still more so in its famous well. Whichever of a newly married pair first drinks of its water will bear rule throughout their life together. All the world knows from Southey's ballad the story of the bride who out-witted her husband by taking a bottle to church.

Keynote. See Tonic.

Key of Christendom, a designation of Buda, the capital of Hungary. Its location on the Danube, and its nearness to Turkey, rendered it of great importance from a strategic point of view. The Turks captured it on two occasions in the 16th century, but in 1686 they were finally driven out.

Key of India, the city of Herat, Afghanistan, so called from its strategic position.

Key of Russia, a designation of Smolensk, a strongly fortified town on the Dnieper, 250 miles W. S. W. of Moscow. It is famous for its spirited resistance to the French in 1812.

Key of the Gulf, the island of Cuba, so named in allusion to its location commanding the entrance to the Gulf of Mexico.

Key of the Mediterranean, the fortress of Gibraltar. It may be said to control the entrance to the Mediterranean from the Atlantic.

Keyser, Jakob Rudolph (kī'zer), a Norwegian historian; born in Christiania, Jan. 1, 1803. Among his many important works were a "History of Norway" (2 vols. 1865–1870); "History of the Norwegian Church under Catholicism" (2 vols. 1856–1858). He died Oct. 8, 1864.

Keystone, in masonry, the central voussoir at the vertex of an arch. The row or course of said stones along the crown of an arch is the key-course. In chromo-lithography, the stone on which a general outline of the picture is drawn or photo-lithographed. Its object is to furnish a guide for the production of the work upon the several color stones. Transfers from the keystones in common printing inks, more properly called "offsets" to distinguish them from transfers from which impressions can be printed, are made upon as many stones as there are colors required. The outlines thus obtained are identical in form and size, and when, by means of the crayon or fluid litho-ink — with subsequent etching — certain portions of each are given the power of printing, the superimposition of impressions from all upon a single sheet of paper, each being printed with its proper color, will give the desired result in perfect register. The keystone may be one of those used in printing, but in the higher class of work it is an outline merely, used to aid the artists in the manner described.

Keystone State, an appellation bestowed on Pennsylvania, because it was the seventh, or central, one of the original 13 States.

Key West, a city and county-seat of Monroe co., Fla.; on the Gulf of Mexico. It is also a port of entry and a noteworthy United States naval station. The city is built on an island of the same name, 7 miles long by 1 to 2 wide, of coral formation, elevated only 11 feet above the sea, and covered with a thin layer of soil on which tropical fruits are successfully cultivated. Key West has an excellent harbor and regular steamer communication with the principal Atlantic and Gulf ports of the United States and with Cuba. During the American-Spanish war the city was the rendezvous of the United States navy. The principal industries are the manufacture of cigars, sponge fishing, green turtle catching, and deep-sea fishing. Key West has a United States Marine Hospital, a shipyard with marine railway, a United States dock, custom house, a convent, and the United States courts for the Southern District of Florida. Pop. (1900) 17,114; (1910) 19,945.

Khaki (kä′kē), an earthy or gray clay color, now largely used to dye the uniform of Indian soldiers and sepoys. The word was given to the service uniform of the American army in the war with Spain and in the operations in the Philippines because of the color. Khaki is also a name for a sect of Vishnuvites, founded by Kil, a disciple of Krishna Das. They are called khaki, because they apply the ashes of cowdung to their dress and persons.

Khalkas Country, a region in the Chinese empire in the N. part of Mongolia. The surface is mostly mountainous, but there are also vast and fertile plains. In the S. it comprises part of the desert of Gobi. It contains many large lakes. It is divided into four khanats, governed by native chiefs tributary to the Chinese. The inhabitants are Mongol Tartars.

Khan, an Asiatic governor; a king, a prince, a chief. Also an inn, a caravansary; of these there are two kinds, one for travelers and pilgrims, where lodging is provided free; the other for traders, where a small charge is made and a toll or duty charged on goods sold therein.

Khandesh (khän-dāsh′), a district of British India, Bombay presidency, forming the most N. portion of the Deccan tableland, and intersected by the Tapti river; area 9,944 square miles; pop. 1,237,231.

Kharkov (kär′kov), the capital of the Russian province of Kharkov, and one of the chief towns of the Ukraine; 465 miles S. by W. of Moscow. It is the seat of a Greek bishop and of a university, with four faculties and about 900 students. Attached to the university (founded in 1805) are an observatory, a library of over 56,000 volumes, a botanical garden, anatomical museum, etc. This university has been an energetic center of the Nihilist movement, especially previous to the assassination of Alexander II. in 1881. The Russian government in their endeavors to stamp out the agitation have greatly crippled the institution in the discharge of its functions as a seat of learning. Pop. (1908) 173,989. The province situated in Little Russia has an area of 21,041 square miles; pop. (1908) 3,111,700.

Khartum, a town in the Eastern Sudan, on the left bank of the Blue Nile, near its junction with the White Nile. It has sprung up since 1830, and was the capital of and largest town in the Egyptian Sudan, and the emporium of a large trade, ivory, gums, ostrich feathers, senna, etc., being exchanged for European goods, and slaves being also dealt in. It was the scene of Gordon's heroic defense against the insurgent Sudanese, and of his death in January, 1885. It was taken and held by the Mahdi and his successor, the Khalifa, till September, 1898, when it was recaptured by General Kitchener. Pop. (1906) 14,823.

Khaya (kā′uh), a genus of trees of the order *Cedrelaceæ.* The kassou-khaye of Senegal (*K. Senegalensis*), one of the most abundant forest trees in that part of Africa, attains a height of 80 or 100 feet, and is much valued for its timber, called cailcedra, or African mahogany, which is reddish colored, very hard, durable, and of beautiful grain. In the marshy coast regions of Gambia the bark is administered in the cure of fever, and Caventon has extracted an alkaloid which has been suggested as a cheap substitute for *Quinia,* a product of the bark of *Hortia braziliana.*

Khayyám, Omar. See Omar Khayyám.

Khedive (ka-dēv′), the official title of the Pasha or Governor of Egypt; it implies a rank superior to a prince or viceroy, but inferior to that of an independent monarch. The title was revived by the Sultan and conferred upon Ismail I. on May 14, 1867.

Khelat. See Kelat.

Khelat, a dress or robe conferred as a mark of distinction. Such dresses are sometimes given by the civil authorities to those dignitaries who have been conspicuously loyal, and by the bridegroom's party at a marriage ceremony to the bride's father, mother, and sister.

Khemmis. See Ekhmim.

Kherson, the capital of the Russian province of that name; on the Dnieper, 19 miles from its mouth and 81 N. E. of Odessa. The town was laid out by Prince Potemkin in 1778 as a port for the construction of ships of war; but in a few years, owing to the unfavorable character of the river, it was supplanted by Odessa and Nikolaieff, both as a dockyard and a commercial outlet. It has a large trade in timber, and

manufactures soap, tallow, beer and tobacco. Wool cleansing is an important industry. At Kherson Potemkin is buried, and John Howard, the prison reformer, died. Pop. (1908) 59,076.

Khiva, a semi-independent khanate of Central Asia, forming part of Turkestan. It formerly occupied a large extent of surface on both sides of the Amu-Darya, or Oxus, but since the cession to Russia, in 1873, of its territory on the E. of the Amu, it is confined to the W. side of this river. It is of a triangular shape, each of its three sides —of which the Amu forms one—being about 300 miles in length. One of its angles rests on the Sea of Aral. A great part of the surface consists of deserts, thinly inhabited or uninhabitable; but along the Amu the land consists of rich alluvial loam of the greatest natural fertility, assisted by irrigation, and securing luxuriant crops of grain, cotton, madder, fruit, including the vine and vegetables. The winter is neither very severe nor prolonged, but the summer is very hot. Manufactures are unimportant. Trade is now being rapidly developed by Russian influence, especially by their Trans-Caspian railway from the Caspian to Samarkand. Pop. (1908) est. 800,000. KHIVA, the capital, lies on an alluvial flat at the junction of two canals, 50 miles W. of the left bank of the Amu. It forms an irregular circuit of about four miles, and is inclosed by a dry ditch and an earthen wall about 20 feet in height and thickness, and entered by 12 gates, the masonry of which is of brick. Among the principal buildings are two palaces of the khan, a number of mosques, and the castles of the principal state officers. Pop. (1908) est. 4,000-5,000.

Khokand. See FERGHANA.

Khootbah, an oration delivered every Friday after the forenoon service in the principal Mohammedan mosques, in which the speaker praises God, blesses Mohammed, and prays for the sultan or king. In former times it was generally pronounced by the reigning khalif or the heir apparent, but that custom has fallen into disuse.

Khorasan (*h*ō-räs-än′), a province of Persia, bordering on Afghanistan; area 140,000 square miles; pop. (1908) est. 860,000. Much of the surface consists of deserts, but there are also fertile districts producing crops of cotton, hemp, aromatic and medicinal herbs. The most valuable mineral is the turquoise from the ancient mines of Nishapur. The principal manufactures are silk and woolen stuffs, carpets, muskets, and sword-blades. About two-thirds of the inhabitants are Persians proper; the remainder are chiefly Turcomans and Kurds.

Khordad (*h*or-däd′), the good genius of the Persians.

Khosru, a Persian prince, who flourished in the 6th century of our era and figures brilliantly in poetry and legend. His grandson, also named Khosru, reigned from 590 to 628.

Khotan (*h*ō-tän′) called locally ILCHI, a city and district of Eastern Turkestan, lying at the N. base of the Kuen-Lun Mountains, and only 6 miles from the desert. The district is rich in gold and jade, manufactures silk, and exports silk stuff, carpets, and jade wear. Pop. of city 40,000.

Khus-khus, a fragrant attar obtained from the khus. Khus-khus tat is a mat or basket-like network made of the khus, used in dry weather in cooling an Indian bungalow. There blows in Central India in April, May, and part of June an intensely hot dry wind. When it sets in, Anglo-Indians take out the window frames and open their doors, closing the gaps thus made with khus-khus tats. A native with a shovel, from time to time, takes up water from a pail and throws it at the khus-khus tat, most of the interstices of which are now closed with drops of water. As the thirsty wind enters the house through the drops, it takes up so much moisture as to become cool and agreeable. When at the approach of the rainy season, about the middle of June, the atmosphere becomes saturated with moisture, it no longer evaporates the drops and the khus-khus tats are taken down.

Khvostchinskaia, Nadezhda Dmitrievna (*h*vo-schin′skä-ē-ä), a Russian novelist; born in Riazan in 1825. A prolific writer, her best works were: "Anna Mikhaïlovna" (1850); "Waiting for Something Better"; the romance "The Country Teacher"; "The Great Bear," the last particularly having a pronounced success. She wrote also good short stories and published poetry. ("Works," 6 vols. 1859.) She died in Peterhof, July 2, 1889.

Khyber Pass (*h*ī′ber), a military road between the Punjab and Afghanistan, winding in a N. W. direction for 33 miles between the projecting spurs of two enclosing ranges of hills. The pass is merely the bed of a narrow watercourse, and varies in width from 150 yards to 20, though in one place it is only 10 feet or less. It is liable at times to be suddenly flooded. The mountains on either side are in many places perpendicular walls of smooth rock, and can be climbed only in a few places; they vary in height from 1,404 to 3,373 feet. Over the roughest parts of the pass artillery has to be dragged by men. The Khyber Pass has been the key of the adjacent regions in either direction from the days of Alexander the Great. During the Afghan wars of 1839–1842 it was twice traversed by a Brit-

ish army in spite of an obstinate defense by the natives. The first fighting in the Afghan war of 1878–1880 was in forcing an entrance into this pass. It was stipulated in the treaty of Gandamak (1879) that the Anglo-Indian authorities were in future to have full control of this pass.

Kiang-Si. See CHIANG-HSI.

Kiang-Su. See CHIANG-SU.

Kiau-Chau (kē-ō-chou'), a town in China, in the province of Shantung, occupied by Germany in 1897, and formally ceded to her on a 99 years' lease by China in 1898. The territory conceded with the town stretches about 160 miles along the coast, and extends inland to an average distance of 20 miles. A dock is being built, and the place is to be made a fortified coaling station, though for commercial purposes the port has been declared free. Railways are being constructed inland to Tsi-nan-fu and Ichow. Pop. (1900) est. 60,000.

Kibitka (kib'it-kä), a Russian vehicle of various sizes, and may be either completely covered, entirely open, or provided with a hood behind. It is wheeled, but in snowy weather is mounted on a single pair of long runners, and, to prevent upsetting, is provided with a guard-frame, which, starting from the body of the sleigh in front, spreads out some 12 or 18 inches from the sides at the rear. As soon as the kibitka tips, this framework touches the ground and must break before the vehicle can capsize. Also a tent used by the nomad tribes of the Kirghiz Tartars. It consists of 12 stakes set up in a circle 12 feet in diameter, and covered with a thick cloth made of sheep's wool.

Kickapoo, the name of a tribe of North American Indians who formerly occupied a portion of the Ohio valley and were a powerful nation in the early history of that region. In 1852 a large number of them went to Texas and from there to Mexico, some of these returning and settling in the Indian Territory. In 1900 the total number both in the United States and in Mexico was estimated at less than 1,000.

Kidd, Benjamin, an English sociologist; born in 1858. He entered the inland-revenue service of Great Britain in 1877. He wrote "Social Evolution" (1894) and "The Control of the Tropics" (1898).

Kidd, William, an American pirate; born probably in Greenock, Scotland. He is supposed to have been the son of a worthy Covenanting minister who was put to the torture of the boot, and who died in 1679. The lad went early to sea, saw much hard service privateering against the French, and gained a high reputation for stubborn courage, and in 1691 a reward of $900 from the council of New York city. At this time the American colonies were supposed to be nests of pirates who infested the Indian Ocean, and Coote, Earl of Bellomont, was sent out by William III. as governor of New York and Massachusetts with special instructions to suppress the pest. A ship of 30 guns was fitted out by a private company in London and given to Kidd, who was furnished, moreover, not only with the usual letters of marque, but with commissions under the great seal both to act against the French and to seize pirates. In January, 1697, he reached Madagascar, the chief rendezvous of the pirates, but ere long disquieting reports reached England that Captain Kidd was playing the game of pirate himself. After a two years' cruise he returned to the West Indies, and a few months later had the temerity to go to Boston without securing himself by a satisfactory safe conduct. In spite of the half promises that had been made him he was arrested and sent to England, where he was tried for piracy and the murder of one of his men. Of the latter charge he was formally found guilty, and hanged at Execution Dock, London, May 24, 1701, protesting his innocence to the last. He had buried a store of treasure on Gardiner's Island, off Long Island, which was recovered and seized, amounting with what was found elsewhere to $70,000. Certain other treasure alleged to have been buried by him has not been found.

Kidder, Daniel Parish, an American clergyman; born in Darien, N. Y., Oct. 18, 1815; became a Methodist minister and was a missionary to Brazil for several years. His publications include "Sketches of a Residence and Travels in Brazil" (2 vols. 1868); "Mormonism and Mormons" (1844); "Treatise on Homiletics" (1864); etc. He died in Evanston, Ill., July 29, 1891.

Kidder, Frederic, an American author; born in New Ipswich, N. H., April 16, 1804; became an antiquarian of authority; gave much time to the study of the language and religion of the New England Indians. His publications include "The Expeditions of Capt. John Lovewell" (1865); "History of the First New Hampshire Regiment in the War of the Revolution" (1868); "History of the Boston Massacre, March 5, 1770" (1870); etc. He died in Melrose, Mass., Dec. 19, 1885.

Kidderminster, a carpet so called from being made somewhat extensively at the town of that name in England. The carpet is also known as Scotch for a similar reason. Another of its names, ingrain, signi-

fies that it is made of wool or worsted dyed in the grain; that is, before manufacture. Its names two-ply or three-ply indicate the number of webs which go to the making of the fabric. It is composed of two webs, each consisting of a separate warped woof; the two are interwoven at intervals to produce the figure, one part being above and the other below. When different colors are used, the pattern will be the same on both sides, but the colors reversed.

Kidnapping, the act of forcibly abducting or stealing human beings; man stealing, child stealing.

"The other offense, kidnapping, being the forcible abduction or stealing away of a man, woman, or child from their own country, and sending them into another, was capital by the Jewish law. So likewise in the civil law, plagium, was punished with death. With us it was punished with fine, imprisonment, and pillory. The offense of child-stealing is now, however, provided for by the statute 24 & 25 Vict., c. 100, s. 56, which makes it a felony, for which penal servitude for seven years may be imposed." — Blackstone.

Kidney, the secreting organs of the urine, two in number, situated in the lumbar region on each side of the spine, which they approach on their upper extremities. The kidney is from four to five inches long, about two and a half broad, somewhat more than one in thickness, and from three to five ounces in weight. Covered by a layer of fat, they rest on the diaphragm, the right, on account of the liver, being somewhat lower than the left. The anterior surfaces are convex, the posterior flat. Above the superior extremity is the suprarenal capsule. The concave border turns outward to the abdomen, and the convex inward to the spine, and is excavated by the *hilus renalis,* a fissure containing the blood vessels and pelvis of the kidney. It is dense and fragile in structure, and invested by a capsular membrane which is easily torn from its surface. When divided longitudinally it contains two structures, an external and vascular, the cortical, and an internal and tubular, the medullary substance. The cones or pyramids of the tubular portions are formed by the *tubuli uriniferi,* and in the cortical substance are found the *corpora Malpighiana,* a mass of minute, red, globular bodies. The ureter is the excretory duct of the kidney. In the interior of the kidney are three cavities, forming together the infundibula. The embryonic and fœtal kidney is composed of lobules. Many diseases may affect the kidneys, as inflammation, cancer, dropsy, gout, tubercle, amyloid or other degeneration, the presence of entozoa, hydatids, etc.

Kidney Bean, the genus *Phaseolus.* The common kidney bean is *P. vulgaris;* the scarlet kidney bean, the scarlet running kidney bean, or scarlet runner, is *P. multiflorus;* its roots are narcotic, as are those of the royal kidney bean, *P. radiatus;* and the underground kidney bean is *Arachis hypogæa.*

Kidney Stones, the name given to small nodules of reddish-brown ironstone veined with calcite, which are common in the Oxford clay in the sea-cliffs and on the shore N. of Weymouth, Dorsetshire, England.

Kidney Vetch, *Anthyllis,* a genus of plants, order *Leguminosæ.* There are many species, both shrubby and herbaceous, but the variety found in Great Britain, chiefly on very dry soils, is the *A. vulneraria,* commonly called lady's fingers, with pinnate unequal leaves, and heads of flowers generally yellow, sometimes graduating toward scarlet.

Kidron. See KEDRON.

Kieff (kē′ef), or **Kiev** (kē′ev), one of the oldest towns of Russia, and ecclesiastically one of the most important; on the Dnieper. According to tradition it was founded before the Christian era. In 882 it was made the capital of the Russian principality, and remained so until 1169. Here in 988 Christianity was first preached in Russia by St. Vladimir; and ever since that date Kieff has been one of the chief ecclesiastical and intellectual centers of Russia. The town was captured and nearly destroyed by the Mongols in 1240, and it remained in their hands for 80 years. From 1320 to 1569 it was in the possession of Lithuania, then of Poland down to 1654, in which year it was annexed to Russia. The town is built on elevated ground (350 feet above the river), trenched by ravines, and is connected with the opposite bank of the Dnieper by a fine suspension bridge built in 1851. The most notable institution in the town is the Petchersk monastery, which is visited by more than 250,000 pilgrims annually. Underneath the monastery are a number of caves containing tombs of the chief saints of the Russian Church. The cathedral of St. Sophia, erected in 1037 on the spot where Yaroslaff defeated (1036) the Petchenegs, contains the tombs of the grand-dukes of Russia and a magnificent altar, ornamented with beautiful mosaics; the interior of the cathedral resembles a labyrinth. The cathedral church of the Assumption harbors the bones of seven saints brought from Constantinople, and has a beautiful belfry with a peal of 12 bells. Altogether Kieff has nearly 70 churches, many of them with gilded domes and pinnacles, which, seen from a distance, give the city a striking

appearance. The university, removed here from Vilna in 1833, has four faculties and (1900) 2,558 students. There are also theological colleges, a military school, and an arsenal. The industry is unimportant, except tanning and the manufacture of wax candles. Considerable trade is done, especially at the fairs, the most celebrated of which is held during the last half of January. Pop. (1897) 247,432. The fortress of Kieff, begun by Peter the Great in 1706, and now fortified in modern style, occupies a commanding site on the right bank of the Dnieper, and serves as a chief depot for war material.

Kiekie (*Freycinetia Banksii*), a scandent shrub of the order *Pandanaceæ*, yielding an edible, aggregated fruit, said to be the finest indigenous fruit of New Zealand. The kiekie is found in the N. part of New Zealand. The fruit is a mass of fleshy berries, and the jelly made of it tastes like preserved strawberries.

Kiel (kēl), a town of the Prussian province of Schleswig-Holstein; 66 miles from Hamburg, at the head of a deep fjord (11 miles long) of the Baltic, which admits large ships to anchor close to the town. It is the headquarters of the German Baltic Sea navy, and has imperial shipbuilding yards, slips, dry and wet docks, etc., naval marine stores, a naval academy, a naval officers' school, and an observatory. It is also an important commercial port, some 1,100,000 tons of merchandise passing in and out annually. The chief part of its trade is carried on with the towns of Denmark and Sweden; corn, coal, timber, and cattle being imported, while coal, flour, beer, butter, cheese, and fish are exported. The industrial activity is considerable, and is mostly exercised in iron foundries, shipbuilding yards, corn mills, breweries, and cabinet makers' works. Kiel is the seat of a university founded in 1665. The castle, built in the 13th century and enlarged by Catharine II. of Russia in the 18th, shelters the university library of 200,000 volumes and a museum with sculptures by Thorwaldsen. The Thaulow Museum contains Schleswig-Holstein carved work of the 15th–18th centuries. The bay is defended by a series of forts placed near its sea entrance. The Baltic canal connects the Elbe and the Bay of Kiel. Kiel affords good facilities for bathing. The old town, dating from before the 10th century, has been enlarged by the suburbs of Brunswick and Düsternbrook; the latter has beautiful promenades. Pop. (1905) 163,772. Here was signed in 1814 the treaty between Denmark, Sweden, and England, by which Sweden exchanged Pomerania for Norway.

Kielland, or **Kjelland, Alexander Lange** (chel'and), a Norwegian novelist and dramatist; born in Stavanger, in 1849. A strong representative of the realistic school, he sought to introduce European culture Into Norway, and was a foe to all forms of ecclesiastical tyranny. His writings have been supposed to show the influence of Balzac and Zola, also of Ibsen and Heine. Notable among his novels are: "Garman and Worse" (1880), his first; "Laboring People" (1881); "Skipper Worse" (1882). The Christmas Story "Else," one of his best productions, has been translated into English by Miles Menander Dawson, and should be read by all who desire to form an opinion of his work. Of his dramas, the best are: "Betty's Formynder" (Betty's Guardian: 1887); "Professoren" (1888). He died April 6, 1906.

ALEXANDER KIELLAND.

Kierkegaard, Soren Aaby (kyer'kegōr), a Danish author; born in Copenhagen, May 5, 1813. His greatest books are: "Either — Or" (1843) and "Stadia on Life's Way" (1845); these and many others were published under fictitious names. Kierkegaard applied the Socratic method to the examination of the fundamental philosophical principles of Christianity, regarded not as an organized or Church religion, but as the religion of the individual soul. Both his thought and style are singularly original. In dialectical skill, eloquence, and imaginative qualities he is scarcely inferior to Plato; and to these he joined wit and a love of irony and paradox. He has been one of the most potent influences in modern Dano-Norwegian literature. In his last years he made a bitter attack on the official Church. He died Nov. 11, 1855.

Kieserite (kē'zer-īt), a sulphate of magnesia obtained at Stassfurt and elsewhere, and employed as a source of epsom salt, and in the manufacture of manures. Mixed with quicklime and water it hardens into a mass which, after heating, pulverizing, and again mixing with water, becomes of a marble-like consistency, and may be made into ornamental articles, etc.

Kikymora (kik-ē-mō′rä), the god of night, in Sclavonic mythology, corresponding to Morpheus of Roman mythology.

Kilauea (kil-ou-ē′ä), an active volcano in Hawaii. It has an oval crater, 9 miles in circumference, with a lake of red and boiling lava at the bottom, over 1,000 feet below the crater's mouth.

Kilda, St., a small and rocky island in the Atlantic Ocean, belonging to Scotland, 40 miles N. W. from the N. W. extremity of the island of N. Uist. It is about 3 miles long by 2 broad, a great portion of its sea-front being composed of perpendicular precipices.

Kildare, a town in Kildare county, Ireland, 30 miles S. W. of Dublin. Bridget founded a nunnery here, and the older name Druim Criaidh was changed to Cil-dara, the cell or church of the oak, from an old tree under whose shadow the saint built her cell.

Kilian, St., the apostle of Franconia; a native of Ireland, who, having been sent by the Pope as a missionary bishop to the heathen, preached at Würzburg about 690, and was slain by his convert Duke Gozbert for denouncing his marriage with Geila, his brother's widow. Würzburg claims him for its first bishop; his day falls on July 8.

Kilima-Njaro (kil-ē-mänjä′ro), an isolated mountain mass in East Africa, standing between Victoria Nyanza and the coast. The mass consists of two peaks, or rather craters, Kibo and Kimawenzi, connected by a broad saddle (14,000 feet) studded with lava hills. Its highest point is about 19,680 feet above sea-level; its crater is 650 feet deep and 6,500 feet in diameter. Kimawenzi is more than 17,250 feet high. The crater rim of both peaks is covered with a thick crust of ice.

Kilkenny, the capital of the Irish county of that name. At one time it had busy linen and woolen manufactures, but very little of either now remains. Near the city is the Roman Catholic college of St. Kyran. Several Parliaments were held at Kilkenny in the 14th century, and even down to Henry VIII. it was the residence, occasionally at any rate, of the lord-lieutenant. It was here that in 1367 was passed the stringent "Statute of Kilkenny," meant to prevent the Anglo-Irish from becoming more Irish — forbidding intermarriage, etc.— and here that in 1642 the Assembly of Confederate Catholics gathered. Cromwell laid siege to the city in 1648, and in 1650 it capitulated on honorable terms. The fable of the "Kilkenny cats," which fought till nothing but the tails were left, was a satire on the contentions of Kilkenny and Irishtown in the 17th century about boundaries and rights, which went on till both towns were impoverished. Pop. (1901) 10,493.

Killarney, a small market town in the county of Kerry, Ireland, 1½ miles from the lower Killarney Lake. Its importance depends on the crowds of tourists who come to visit the famous lakes. On the shores of the lakes are marble quarries, yielding several varieties — green, red, white, and brown — and also some old copper mines. Pop. (1891) 5,510.

Killarney, Lakes of, a series of three connected sheets of water, the lowermost of which is within 1½ miles of the town of Killarney. The outflow is by the river Laune N. W. to Castlemain Harbor. These famous lakes are situated in a basin in the midst of the mountains of Kerry, some of which rise abruptly from the water's edge densely clothed with trees from base to summit. Arthur Young called those which surround the upper lake "the most tremendous mountains that can be imagined," and said that the wooded hills along the margins "form the most magnificent shore in the world." Between the lower and the middle lakes is the fine ruin of Muckross Abbey. A peculiarity of the scenery is the luxuriant growth of arbutuses on the islands of the lakes, which add such richness and color to the general effect.

CRATER OF KILAUEA.

Killdee, or **Killdeer,** a small American bird akin to the plover. It is of a light brown color above, each feather tipped with brownish-red. There is a black ring round the neck.

Killer Whale, one of the *Delphinidæ* (dolphins). It is from 18 to 30 feet long, glossy black above, and white below, with a white patch above the eye, and sometimes a grayish saddle mark on the back. The mouth has 11 or 12 powerful, conical, slightly recurved teeth in each jaw. Its fierceness and voracity constitute it the terror of the ocean. Eschricht took 13 porpoises from the stomach of one, and found that it had choaked itself in swallowing a 14th. Not merely seals and walruses, but even huge sperm Greenland whales dread its attacks. They hunt in small packs, and are particularly abundant near some of the Pacific sealing grounds; they also try to devour the whales struck by harpoons.

Killhart. See GELLERT.

Killiecrankie, a pass through the Grampian Mountains, in Scotland. The road which traverses it is cut out of the side of one of the contiguous mountains; and below it, at the foot of a high precipice, in the bottom of the ravine, the river Garry dashes along over rugged rocks, but so shaded with trees as to be hardly discernible. At the N. extremity the Revolutionary army under General Mackay was utterly defeated, in 1689, by the Royalists under Grahame of Claverhouse, who fell in the moment of victory.

Killigrew, Sir William, an English dramatist; born in Handworth in 1605. His dramas were praised by Waller. "Selindra" (1665) and 'Ormasdes" (1665), two tragi-comedies — so called because, though they end happily, they contain violent deaths — are good specimens of his work. He was a Member of Parliament and a courtier. He died in London in 1693.

Kiln, a furnace for calcining; as plaster of Paris or carbonate of lime in its shapes of marble, chalk, or limestone; for baking articles of clay in the biscuit condition, as a biscuit-kiln; for drying malt, hops, lumber, grain, fruit, starch, biscuit, etc.; for vitrifying articles of clay, such as pottery, porcelain, bricks.

Kilogramme, or **Kilogram,** a French measure of weight = 1,000 grammes. A kilogramme as a measure of mass = 15,432.34874 grains, of which the new standard pound contains 7,000. A kilogramme weighs 9.81×10^5 dynes nearly. In measuring pressure, a kilogramme per square meter = 98.1 dynes per square centimeter nearly; a kilogramme per square decimeter = 9.81×10^3 dynes per square centimeter nearly; a kilogramme per square centimeter = 9.81×10^5 dynes per square centimeter nearly; a kilogramme per square millimeter = 9.81×10^7 dynes per square centimeter nearly.

Kiloliter, or **Kilolitre,** a French measure of capacity for fluids, 1,000 liters

Kilometer, or **Kilometre,** a French measure of length or distance, 1,000 meters. It is 1093.63 yards, about five-eighths of a mile.

Kilowatt, an old French solid measure, containing 1,000 cubic meters = 35316.6 English cubic feet.

Kilpatrick, Hugh Judson, an American military officer; born in Deckerton, N. J., Jan. 14, 1836. He was graduated at West Point in 1861. He served as captain at the battle of Big Bethel, and in the autumn of 1861 became a lieutenant-colonel of cavalry. In 1862 he took part in various operations of the army of the Potomac. He was appointed a Brigadier-General of volunteers in May, 1863, after which he was employed in a raid to Richmond for the release of Federal prisoners. He commanded the cavalry of Sherman's army in its march from Atlanta to Savannah, November-December, 1864. He was minister to Chile from 1865 to 1870, was reappointed in 1881. He died in Valparaiso, Dec. 4, 1881.

Kilsyth, a town of Stirlingshire, Scotland, 13 miles from Glasgow, with quarries and coal and iron mines. Here, in August, 1645, Montrose, with 4,900 followers, almost annihilated 7,000 Covenanters under Baillie. A remarkable religious revival took place here in 1839, originating in the preaching of W. C. Burns, afterward missionary to China.

Kilwa. See QUILOA.

Kimball, Hannah Parker, an American author; born in Boston, Mass., April 25, 1861; received her education in Boston and at Cornell University. She was the author of "Soul and Sense" (verse, 1896); "Victory, and Other Verses" (1897); and much fugitive verse in the magazines.

Kimball, Harriet McEwen, an American author; born in Portsmouth, N. H., in November, 1834; known as a religious poet; was principal founder of the Portsmouth Cottage Hospital. Her publications include "Hymns"; "Swallow Flights"; "Blessed Company of All Faithful People"; and "Poems."

Kimball, Richard Burleigh, an American author; born in Plainfield, N. H., Oct. 11, 1816; was graduated at Dartmouth College in 1834 and later admitted to the bar; practised his profession in Waterford, N. Y., and subsequently in New York city. His publications include "Letters from England" (1842); "Cuba and the Cubans" (1850); "Romance of Student Life Abroad" (1853); "Under-Currents of Wall Street" (1862); "Henry Powers, Banker" (1868). He died in New York city, Dec. 28, 1892.

Kimball, Sumner Increase, an American executive; born in Lebanon, Me., Sept. 2, 1834; was admitted to the bar in 1858; be-

came chief of the Revenue Marine Service and of the Life-Saving Service in 1871, when the latter was made a separate bureau. He is the author of "Organization and Methods of the United States Life-Saving Service" (1889).

Kimberley, capital and chief town of Griqualand West, South Africa, the most important inland town of the Cape Colony. The British flag was first hoisted at Kimberley in November, 1871; but Griqualand West did not become an integral portion of the Cape Colony till October, 1880. The climate is healthy, though hot in summer; the neighboring country, in the places where water can be obtained, fertile. The wants of the town have been abundantly provided for by waterworks carried out at a cost of nearly £500.000, for which water is obtained from the Vaal river.

The rise of Kimberley has been rapid; and its situation is favorable to its further development. It holds the direct road from Cape Town and the sea to the Orange River Colony, the Transvaal, and the immense territories to the N.; and is important to travelers and "up-country" traders as the emporium and starting-place for the interior. There are a handsome town hall, post-office, public library, and botanic gardens. Kimberley owes its existence to the diamond mines, the working of which dates from July, 1871, and of which the most important are Du Toit's Pan, Bultfontein, De Beer's, and Kimberley Central. The town was the center of important military operations in 1900, during the Boer war. Pop. (1904) 34,331.

Kimchi, David (kim'chē), a Jewish grammarian; born probably in Narbonne, France, about 1160. His father, Joseph Kimchi, was the author of a number of commentaries and other theological works. His brother Moses wrote similar works and a Hebrew grammar. His own celebrity, however, far exceeds theirs, and even with competitors like Rashi and Ibn Ezra he preserved his place as the most popular of Jewish commentators. His grammar "Michlol," and his lexicon, "Sefer hashorashim," have to a certain degree been the basis of all subsequent Hebrew grammars and lexicons. His commentaries include almost all the books of the Old Testament. He died in Narbonne about 1235.

Kimmeridge Clay, a thick bed of Upper Oölitic clay or bituminous shale, occurring in Kimmeridge, Isle of Purbeck, and in Wiltshire, etc. It sometimes forms an impure coal several hundred feet thick. In parts of Wiltshire it resembles peat, and may have been derived in part from the decomposition of vegetables; but, as its chief fossils are ammonites, oysters, and other marine shells, the remains of vegetables being but few, it may be of animal origin. It underlies the Portland Sand.

Kin, the name applied to persons who stand related to another by family ties. When a person dies intestate his real property devolves, according to law, on his heir and his personal property is distributed among his next of kin. The degrees of kindred are divided into lineal and collateral. The lineal consists of the ascending, such as father, mother, grandfather, grandmother, paternal and maternal, and so on *ad infinitum;* and the descending, such as son, daughter, grandson, granddaughter, and so on *ad infinitum.* The collateral kindred consists of brothers, sisters, uncles, aunts, etc., and the children of such *ad infinitum.*

Kinburn, or **Kilburn,** a former fort of South Russia, opposite Otchakoff, on a long narrow sandbank which forms the S. boundary of the estuary of the Dnieper. Paul Jones first suggested to Suvaroff that it should be fortified; it figured prominently in the Russo-Turkish wars of 1771–1774 and 1787; and during the Crimean War it fell before the allies, Oct. 17, 1855. The fortifications were razed in 1860.

Kinchok, one of the two chief divinities of Tibet.

Kincob, or **Kincoub,** an Indian textile fabric of muslin, gauze, or silk, woven in various ways, and sometimes embroidered with gold or silver. It is used for both male and female dress.

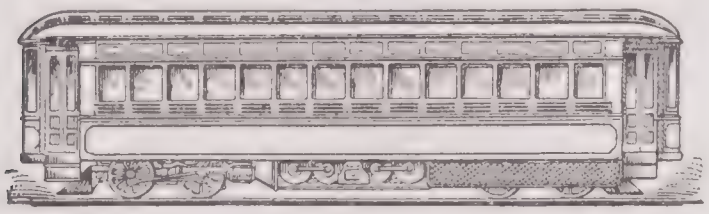
Kind, Johann Friedrich (kint), a German writer; born in Leipsic, March 4, 1768. His works consisted of poems, novels, and dramas, among the latter being the librettos of Kreutzer's opera, "The Night Camp of Granada," and Weber's "Der Freischütz" (1821). He died in Dresden June 25, 1843.

Kindergarten, a system of education for infants and young children devised by Frederick Fröbel (1782–1852), by whom, in conjunction with Ronge, it was first carried out at Hamburg in 1849. In 1858 Ronge published a work on the subject. Knowledge is imparted in an attractive form, chiefly by simple object lessons, by toys, games, singing, and work — plaiting, weaving, folding, and cutting out paper. Corporal punishment is excluded. The chief merit of Fröbel's method appears to lie in the fact that he makes education a real drawing out, not a mere imparting of instruction, which he considers as a means, not an end; his object is the unfolding of the child's whole nature, with a view to free self-development and action. The kindergarten system is becoming increasingly popular in the United States, and is now a part of the public school system in all large cities.

Kinderscout Grit, a name given to the coarse grits and flagstones which occur toward the base of the Millstone Grit of England. The rock forms the tableland of Kinderscout in the Peak country. The grit is quarried at Eyam Moor, Derwent Edge, and other places, and is used for engine beds, foundations, and reservoir work.

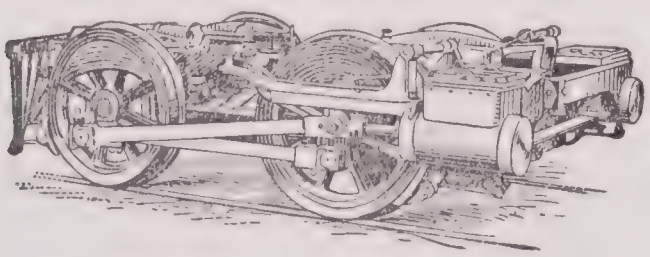
Kinematics, the science of pure motion, admitting conceptions of time and velocity, but excluding the conception of force. Newton's fluxions are a purely kinematical method. From the kinematics of a point, all the properties of a curve may be deduced.

Kinetic Motor, a vehicle impelled by means of stored energy. It is really a "stored-steam" system. A car is fitted



KINETIC MOTOR CAR.

with a storage reservoir, a small firebox and an apparatus for condensing the exhaust steam promptly and without noise. The driving mechanism is that of the locomotive, but there is no noise or show of smoke, steam or cinders. Water is heated in the stationary boiler at the charging station at a temperature of about 400 degrees, and is then charged through conductors into the reservoir of the motor up to a certain level, leaving adequate steam space. A charge of prepared anthracite coal, heated to incandescence and giving out no cinders or dirt or smoke, is placed in the firebox under the boiler of the motor. The car is then ready for a run of 20 miles or more.



KINETIC MOTOR TRUCK.

Kinetics, a branch of dynamics which treats of forces imparting motion to or influencing motion already imparted to bodies.

Kinetograph, an apparatus for taking pictures of moving objects in their changing positions. It was invented by Edison. By means of the peculiar mechanism with which it is provided, a series of photographs about 40 to the second, can be taken. So rapidly does this machine work that every motion of a dancer's feet, every twist or turn of a club swinger's wrists and arms are reproduced. The impressions are taken on a long strip of gelatine film with such rapidity and accuracy that not the faintest motion of the performing athlete is missed.

Kineto=phonograph, an apparatus combining the principles of the kinetograph, the vitascope, and the phonograph, invented by Thomas A. Edison. The kineto-phonograph is such a combination of electricity and photography that a man can sit in his own parlor and see reproduced on a screen the forms of the players in an opera produced on a distant stage, and, as he sees their movements, he will hear the sound of their voices as they talk or sing or laugh.

Kinetoscope, an instrument invented by Perigal, for illustrating the result of the combination of circular movements of different radii in the production of curves; called also kinescope. Also an apparatus invented by Thomas A. Edison for exhibiting the pictures taken by the kinetograph. The kinetoscope displays the pictures to the eye, one after another, so rapidly that they all seem like one scene, with the figures moving about as they do in actual life.

King, Alice, an English novelist; born in Cutcombe, Somersetshire, in 1839. Though she became blind at the age of seven, she learned seven languages, and was a prolific writer for magazines and author of novels, composing her manuscript by the aid of a typewriter. Among the most popular of her works were: "Sir Tristram's Will" (1867); "Hearts or Coronets" (1876); "Fettered Yet Free" (1883); "A Strange Tangle" (1885). She died in May, 1894.

King, Charles, an American soldier and novelist; born in Albany, N. Y., Oct. 12, 1844. He resigned from the United States army in 1879, becoming Professor of Military Science and Tactics at the University of Wisconsin (1881) and devoting his time largely to literature. On the outbreak of the war with Spain he was commissioned a Brigadier-General of volunteers and went to the Philippines with Lawton. In 1901 he became commandant at Orchard Lake Military Academy. He wrote a long series of novels treating of army and frontier life and people, among the best of which are: "The Colonel's Daughter" (1883), describing life in a frontier fort; "Kitty's Conquest" (1884), very popular; "Famous and Decisive Battles of the World" (1884); "The Colonel's Christmas Dinner and Other Stories" (1892); "Captain Close and Sergeant Crœsus" (1895); also "Campaigning with Crook" (1890); "Trials of a Staff Officer" (1891); "From School to Battlefield" (1899); "Ray's Daughter" (1900); etc.

King, Clarence, an American geologist; born in Newport, R. I., Jan. 6, 1842. In 1863 he joined the State geological survey of California, making the first detailed sur-

veys of the Yosemite Valley. In 1867 he was in charge of the United States geological survey of the 40th parallel, and for the next five years did work from the California Sierras to Eastern Wyoming, the results of which were registered in two atlases and the seven quarto volumes entitled "Professional Papers of the Engineer Department of the United States Survey" (1870–1878). When in 1879 the different geological surveys were united in one bureau of the Department of the Interior, he was made first director of the Survey, holding the position till 1881, when he resigned. He has since carried on independent geological investigation, and contributed many able and important papers to scientific periodicals in this country and Europe. He was elected in 1876 a member of the National Academy of Science. His best known book, "Mountaineering in the Sierras," is not merely a contribution to technical knowledge in this field, but a brilliant literary performance. He died in Arizona, Dec. 24, 1901.

King, Edward, an American writer; born in Middlefield, Mass., in 1848. He was both a journalist — being well known as a Paris and a war correspondent — and an author. His specialties were our own Southern States and French themes. Among his works were: "My Paris, or French Character, Sketches" (1868); "Kentucky's Love, or Roughing It Around Paris" (1872); "The Great South" (1875); "A Venetian Lover" (1887), a poem; "The Gentle Savage" (1888), a popular novel. He died in Brooklyn, N. Y., in 1896.

King, Grace Elizabeth, an American writer; born in Louisiana in 1858. She was one of the most prominent of Southern writers, and her books largely deal with Southern subjects. Her novel "Monsieur Motte," which appeared first in the "New Princeton Review," was republished in book form in 1888. "Balcony Stories" was one of her best works; others can be seen in "Tales of a Time and Place." Her historical writings embrace "New Orleans, the Place and the People," and a "Life" of Bienville, the founder of New Orleans.

GRACE ELIZABETH KING.

King, Horatio, an American statesman; born in Paris, Me., June 21, 1811; learned the printer's trade; was appointed clerk in the postoffice department in Washington in 1839; became first assistant postmaster-general in 1854; was Postmaster-General January-March, 1861; was the first man in public office to deny the power of a State to withdraw from the Union. His publications include "An Oration before the Union Literary Society of Washington" (1841); and "Sketches of Travel; or Twelve Months in Europe" (1878). He died in Washington, D. C., May 20, 1897.

King, Rufus, an American statesman; born in Scarboro, Me., March 24, 1755. He was a student at Harvard College in 1773, was admitted to the bar in 1778; elected to Congress in 1784; elected to the United States Senate, serving 1789–1796; was United States minister to Great Britain, 1796–1803; was sent for the third time to the Senate in 1813, and won renown as an orator by the brilliant speech he made on the burning of Washington by the British. In 1819 he was again elected to the Senate, serving till 1825, when he was appointed the second time minister to the Court of St. James. He was the Federalist candidate for the vice-presidency in 1804 and 1808. He, in collaboration with Hamilton, wrote the "Camillus Letters." He died in Jamaica, Long Island, N. Y., April 29, 1827.

King, Thomas Starr, an American clergyman; born in New York city, Dec. 17, 1824. During the Civil War he worked earnestly for the Union cause and was the chief factor in raising the large sums of money which enabled the United States Sanitary Commission to carry on its work among the sick and wounded soldiers. He was a frequent contributor to the "Universalist Quarterly" and was the author of "White Hills, Their Legends, Landscapes and Poetry." After his death some of his writings were collected and published under the title of "Patriotism and Other Papers." He died March 4, 1864.

King, William Rufus, an American statesman; born in Sampson co., N. C., April 6, 1786. He was United States Senator from that State in 1819–1844; minister to France in 1844; presiding officer in the United States Senate in 1850. In 1852 he was elected Vice-President of the United States, and died near Cahawba, Ala., April 18, 1853.

King-at-Arms, one of three officers of great antiquity, whose business it is to direct the heralds, preside at their chapters, and have the jurisdiction of armory. There are three kings-at-arms in England, Garter, Clarencieux, and Norroy. The first of these is called the principal king-at-arms, the other two provincial kings-at-arms; Clarencieux officiating S. of the Trent, and Norroy

N. of that river. There is a Lyon king-at-arms for Scotland, and an Ulster king-at-arms for Ireland.

Kingbird, a name given to a shrike, the *Tyrannus intrepidus*, of the United States. It is above of a dark slaty ash-color, and beneath white; the feathers of the crown are orange. They build in the United States, breeding in general twice a year, and laying five eggs each time. Named from an erectile orange-colored crest on the head, which has been compared to a diadem; as also from the tyrannical character of the bird. It is insectivorous, and is not in good repute with beekeepers, from the number of bees which it destroys.

King Cole, a legendary King of Britain, who lived in the 3d century.

King Cotton, a popular personification of the cotton plant in the United States. Its supremacy in commerce and politics was strongly asserted by politicians in the cotton-growing States just before the Civil War, "Cotton is king" was a frequent declaration.

King-Crab, the English name of the crabs belonging to the genus *Limulus*. They have their body commencing in front with a broad crescent-shaped carapace, with its convexity forward. Behind this is an hexagonal portion, formed by the coalescence of the abdominal segments, the whole terminated posteriorly by a long spine-like tail. Above, the body is convex; beneath, it is concave, the feet being lodged in the cavity. The kingcrabs are the only representatives of the order and subdivision of *Crustacea* called *Xyphosura*. They are found in the seas and islands of both the Asiatic and American shores of the Pacific Ocean.

Kingdom, the designation of the highest and most comprehensive of the divisions into which natural objects are arranged. They are three in number, the Animal, the Vegetable, and the Mineral kingdoms. The designation was introduced or received an impulse from Linnæus, who divided the Imperium Naturæ into three Regna Naturæ: (1) Regnum Animale, (2) Regnum Vegetabile, and (3) Regnum Lapideum.

Kingdom of Heaven, or **Kingdom of God.** See HEAVEN.

Kingfish, a beautiful member of the mackerel family. The back and sides are of a rich green, with purple and gold reflections; the under parts yellowish-green, a few white spots above and below the lateral line; the fins vermilion. Called also the opah.

Kingfisher, the genus *Alcedo*. The common kingfisher, *A. ispida*, is blue above, greener on the mantle and scapulars, with beautiful rich cobalt on the back, rump, and upper tail coverts; a spot in front of the eye, the eye coverts and under parts are rufous; the head is blue, barred with black; the wings blue, with spots of brighter cobalt on the coverts; the throat and a patch on each side of the neck are white; the cheeks and sides of the breast are blue; the bill black, the feet red. The female and young are like the male, but are red at the base of the under mandible. Length seven inches. Note like "ti-ti-ti." A shy bird, but may be seen on the upper part of the Thames and other rivers in the S. of England perched over the water, into which it darts from time to time, bringing back a fish or a water insect, which it kills with a few raps on its perch, and then devours. Occasionally it hovers for a few seconds.

KINGFISHER OF EUROPE.

It bores a hole in the ground, makes a nest of fish bones, and lays six or seven eggs, the whole process taking about 21 days.

King George's Sound, an inlet 5 miles N. and S., and 5 miles broad, at the S. W. angle of Western Australia; is an excellent roadstead, and contains two landlocked recesses, Princess Royal and Oyster Harbors. Albany, on Princess Royal Harbor, is a port of call for mail steamers. The fortification of the sound has been recommended by some English military authorities, and an imperial naval depot has been proposed.

King George's War, a war between Great Britain and its American colonies, against France and its Indian allies, so named from King George II. Its principal event was the capture of Louisburg, on Cape Breton Island, the strongest and most important French fortress in America except Quebec. The war began in 1743 and was ended in 1748 by the treaty of Aix-la-Chapelle.

Kinglake, Alexander William, an English historian; born in Taunton, Devonshire, England, Aug. 5, 1809. Having accompanied the English army to the Crimea in 1854, he wrote his masterpiece, "The Invasion of the Crimea, its Origin and an Account of its Progress" (8 vols. 1863–1887). It is the standard work on the subject, written in an almost perfect style, though perhaps it is slightly diffuse, and partial to his friend Lord Raglan. Before the Crimean War he had written "Eöthen; or Traces of Travel Brought Home from the East," a delightful record of personal experiences and a brilliant book of travel, with a light touch yet often penetrating to the springs of Oriental feeling. He died in London Jan. 2, 1891.

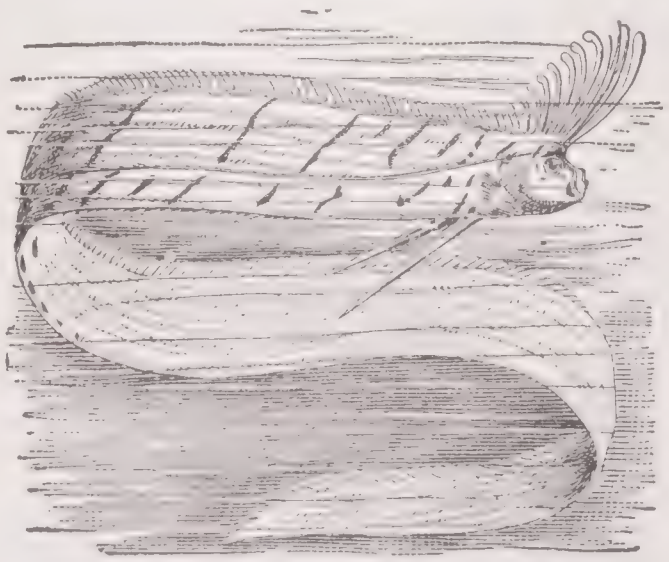
Kingo, Thomas (kin'gō), a Danish poet; born in Slangeruh, Seeland, in 1634. His secular poetry was commonplace; but the hymns, of which he wrote 41, elevated in thought and beautiful in style, may be said to have made him the John Keble of Denmark. More than two centuries old, they are sung today in Danish churches, and will continue in use while the Danish tongue endures. They appeal both to the cultivated and the rude. The best of them may be seen in his "Hymn Book" (1689). He died in 1703.

King of the Herrings, the popular name given to the *Chimæra monstrosa,* or Northern or Arctic chimæra, a fish also known in certain localities by the name of sea cat. It feeds on herrings and other smaller fish, but also appears to subsist on crustaceans and lower forms of marine life. It is included in the order *Elasmobranchii,* and is thus a near ally of the sharks and rays. The king of the herrings inhabits the Northern seas generally, and occurs occasionally on the British coasts. It varies from three to four feet in length. The Southern chimæra (*Callorhynchus Australis*) is distinguished by having a curious hoe-like appendage attached to the snout.

King Philip's War, a conflict between the New England colonists and the confederated Indian tribes, the Narragansetts, the Wampanoags, and the Nipmucks, carried on in 1675–1676. The Indians were led by Philip, a chief, who was killed at Mount Hope, R. I. Of the 90 towns of the colonists 12 were utterly destroyed, while more than 40 others suffered from fire and pillage. More than 1,000 men were killed and many women and children. The Indians were annihilated.

Kingpost, or Kingpiece, the middle post of a roof, standing in the tie beam and reaching up to the ridge; it is often formed into an octagonal column with capital and base, and small struts or bases, which are slightly curved, spreading from it above the capital to some other timbers. Also known as crown post, or joggle post.

Kings, a name of two books of the Old Testament, relating the history of the Hebrew monarchy (united and divided) from the proclamations of Solomon, a little before the death of David, to the death of Jehoiachim — a period not less than 431, and perhaps more than 453 years. In Hebrew, the two Books of Kings were originally one volume: the Septuagint divided them, calling them the third and fourth of the Kingdoms, and the Vulgate the third and fourth of the Kings. Next, Bomberg separated the Hebrew book into two, after the Greek model. The division is clumsily made in the middle of Ahaziah's reign, and with no important break in the historic narrative. There are resemblances so considerable between the books of Judges, Ruth, I and II Samuel, and I and II Kings, that some have supposed them a continuous narrative from a single author or editor; but there are sufficient differences between the books of



KING OF THE HERRINGS.

Samuel and Kings to render it more probable that they were independent works. The unity of style between I and II Kings proves them to have had the same editor. The materials to which he had access for the composition of the book seem to have been governmental records, published histories of individual kings, with memoirs of Elijah and Elisha, not from a cold, official pen, but from an enthusiastic friend and admirer. The work contemplates events from the prophetic, as the books of Chronicles do from the priestly, point of view. The former gives prominence to the history of the Ten Tribes, among which most of the prophets labored; the latter to that of the Two Tribes, among whom the priests found their home. Both taught that the Jewish monarchy was a theocracy, with Jehovah for its real sovereign, and was prosperous or otherwise according as his earthly vicegerents carried out or departed from his commands. The chronology is difficult, the

Hebrew figures being represented by letters, a small change in the form of which would greatly alter results. It agrees, however, well with the Egyptian, and would not require much alteration to adjust it to the Assyrian chronology. Keen study of the Books of Kings is needful to the comprehension of the Old Testament prophetic writings, which in their turn reflect great light on the historic narratives in Kings. Recent archæological researches have afforded much confirmatory evidence in favor of the sacred narrative. It is believed that Shishak (I Kings xiv: 25, 26), So, or Sevek (II Kings xvii: 4), Tirhakah (xix: 9), and Pharaoh Nechoh (II Kings xxiii: 29, 30), figure on the Egyptian monuments. The Assyrian account of Sennacherib's expedition against Hezekiah is on a little barrel-like cylinder, covered with arrow-headed characters, in the British Museum. Omri (I Kings xvi: 16, 17, etc.), Jehu (II Kings ix: 2), Menahem (xv: 14), Tiglath Pileser (xvi: 10), and Shalmaneser (xvii: 3), are also on the Assyrian tablets. There is a lengthened account of Mesha, the sheepmaster, on the Moabite stone (II Kings iii: 4, 5). The Books of Kings, or narratives derived from them, are alluded to in many passages of the New Testament.

King's College, an institution adjoining Somerset House in London, founded by royal charter in 1828, and confirmed by act

INTERIOR OF KING'S COLLEGE.

of Parliament in 1882. The college being strictly in connection with the Church of England, divinity lectures are a regular part of its routine. The usual university education for young men is provided in theology, literature (ancient and modern), science, engineering and applied science, and medicine. It has also a school of fine art, and a department for the preparation of candidates for the civil service. The instruction is adapted for students above the age of 16, but there is a school (1830) for boys in connection with the college, with workshops for mechanical training. There is a branch at Kensington for the higher education of women; also evening classes for students occupied during the day. The museum has a collection of models and instruments.

King's (or **Queen's) Counsel,** certain barristers at law, in England and Ireland, who have been appointed by letters-patent. The office is entirely honorary, but it gives a right of preaudience in all the courts, according to the date of appointment. The appointment practically belongs to the Lord Chancellor. In spite of their title, they are not prevented from being retained and acting for ordinary clients, except that in defending prisoners and acting in suits against the crown they require a special license from the crown, which is, however, never refused.

King's Crag, a name for Fife, in Scotland, so named because Alexander III. of Scotland was killed there by his horse falling over the precipice in the dusk of evening.

King's Daughters and Sons, International Order of the, a society composed of men, women, and children of all religious denominations, whose object is to minister to the sick and needy wherever found, and to do good to all with whom they come in contact. The original circle (of women) was formed in New York in 1886, and its members are found in almost every State in the Union. There are also branches in several foreign countries. The badge is a small silver maltese cross, generally suspended by a purple ribbon.

King's (or **Queen's) Evidence,** evidence given by an accomplice in a crime, when other evidence is deficient, on condition that he himself shall go free for his share in the crime. It is the British equivalent of State's evidence.

King's Evil, an old name for scrofula, which was believed to be cured by the royal touch. The practice began with Edward the Confessor in 1051. It reached its maximum in the ultra-loyal days of Charles II., when it is said that 92,107 persons were touched. In 1712 Queen Anne officially intimated her intention of touching persons afflicted; but two years later (in 1714) George I. discontinued the practice. In 1719 the office for the ceremony was expunged from the litany. Charles Edward touched a child for the king's evil at Holyrood in October, 1745. In 1775 Louis XVI. touched 2,400 people for the disease, and, it was alleged, success-

fully. The distinguished Dr. Johnson is said to have sought the royal touch to deliver him from scrofula.

Kingsford, William, a Canadian historian; born in London, England, in 1819; studied engineering and settled in Canada, where he became prominent in that calling. His publications include "The History, Structure, and Statistics of Plank Roads in the United States and Canada" (1851); "The Canals: Their History and Cost" (1865); and "The History of Canada" (1880), a well-known work. He died in Ottawa, Ontario, Sept. 29, 1898.

Kingsley, Charles, an English author; born in Holne, near Dartmoor, Devonshire, June 13, 1819. After receiving the first part of his education at home, he became a pupil of Derwent Coleridge, from whose care he passed to King's College, London, and thence to Magdalen College, Cambridge, where he graduated with high honors as B. A. in 1842. Soon after graduation he was ordained, and obtained the curacy of Eversley, to the rectory of which he was presented in 1844. This living he retained till his death, but he also held in succession two canonries, first one in the Cathedral of Chester from 1869 to 1873, and then one in the chapter of Westminster from 1873 till his death.

Kingsley's literary career began with the publication of "The Saint's Tragedy" (1848), a drama in verse on the story of St. Elizabeth of Hungary. This was followed by a series of novels that caught the attention of the best readers; the first being "Alton Locke, Tailor and Poet" (1849), which led to the establishment of coöperative associations in England, and contained the author's views as a Christian socialist, as did also "Yeast" (1851). "Hypatia" (1853) described pagan and Christian life in Alexandria early in the 5th century. "Westward Ho!" (1855) narrated the adventures in the New World of Sir Amyas Leigh, with Sir Walter Raleigh, Drake, Hawkins, etc., as fellow characters. "The Water Babies" (1853) was a fairy tale enjoyed by readers of all ages. Of his verse, "Poems," chiefly lyric, appeared in 1856, again in 1875, and "Andromeda and Other Poems" in 1858. "Lectures delivered in America" (1875) contained addresses given during his visit to the United States in 1874. His controversy with John Henry (afterward Cardinal) Newman in 1864 led to the latter publishing his celebrated "Apologia pro Vita Sua." Kingsley became Professor of Modern History at Cambridge in 1859, chaplain to the queen in 1860, canon of Westminster in 1873. He died in Eversley, Hampshire, Jan. 23, 1875.

Kingsley, Henry, an English novelist; brother of Charles; born in Barnack, Northamptonshire, Jan. 2, 1830. An unsuccessful experiment at gold mining in Australia gave him the material for his first novel, "The Recollections of Geoffrey Hamlyn" (3 vols. 1859), which was well received. He followed it with a long list of popular novels, among them "Ravenshoe" (1861), generally considered his best work; "Austin Elliot" (2 vols. 1863); "The Hillyars and the Burtons" (3 vols. 1865); "Leighton Court" (2 vols. 1866). A humorous strain in his writings contrasts forcibly with his brother's work. He was also a worker for reviews and newspapers, being a special correspondent in the Franco-Prussian War. The battle of Sedan, at which he was present, formed the subject of "Valentin: A French Boy's Story of Sedan" (1872). He died in Cuckfield, Sussex, May 24, 1876.

Kingsley, Mary H., an English author; born in 1850; daughter of Dr. George H. Kingsley, and niece of Canon Kingsley, traveled extensively in West Africa, and was a Fellow of the Anthropological Institute of Great Britain and Ireland. Her works include "Travels in West Africa" (1897); "West African Studies" (1899); and "The Story of West Africa" (1900). She died in Simonstown, Cape Colony, June 5, 1900.

King's Mountain, an eminence in York co., S. C., 80 miles N. W. of Columbia, where a battle took place Oct. 7, 1780, between the Americans, under Levier, Shelby, Campbell, etc., and the British, under Ferguson. The latter were defeated with a loss of 456 killed and wounded, among whom was the commander, and 648 taken prisoners.

King's Silver, money paid to the king in the English Court of Common Pleas for a license granted to a man to levy a fine of lands, tenements, or hereditaments to another person; and this must have been compounded according to the value of the land, in the alienation office, before the fine would pass.

Kingston, a city and county-seat of Ulster co., N. Y.; on the Hudson river at the E. terminus of the Hudson and Delaware canal, and on the West Shore and other railroads; 91 miles N. of New York city. It comprises the former villages of Kingston, Rondout, and Wilbur; has a large river commerce and trade in coal, brick, lime, lumber, cement, and bluestone; is a trade center for three counties with a population of 160,000; and contains Kingston and Ulster Academies, Children's Industrial Home, a city hospital, a gravity system of waterworks supplied by mountain streams, and National and savings banks. In 1900 it had a total assessed property valuation of $12,504,688. It received a charter in 1661, under the name of Wiltwick, was first settled in 1665, and was incorporated by patent in 1667. On Feb. 19, 1777, the first State convention adjourned from Fishkill

to Kingston, and the first State constitution was proclaimed in front of the court house, April 22, 1777. The Legislature met here in September of the same year, but was dispersed by the approach of a British force under Sir Henry Clinton, Oct. 7, when the town was burned. Being afterward rebuilt, it was incorporated as a village in 1805, and as a city with enlarged area in 1872. Pop. (1900) 24,535; (1910) 25,908.

Kingston, the commercial capital of Jamaica; on the N. side of a landlocked harbor. It was founded in 1693, after the neighboring town of Port Royal had been destroyed by an earthquake; was itself practically destroyed similarly in 1907; and has since been rebuilt. Pop. (1908) 48,500.

Kingston, a city of Ontario, Canada, a port of entry, and the county-seat of Frontenac co.; situated on the Cataraqui river, at the N. E. extremity of Lake Ontario, at a point where the St. Lawrence river leaves the lake, and on the Grand Trunk, the Kingston and Pembroke, and the Bay of Quinte railways; 172 miles S. W. of Montreal and 165 miles E. of Toronto. It is the outlet of the traffic of the picturesque Rideau canal system, and a point of transshipment for products from the Great Lakes destined for Montreal and European ports. The leading streets are Princess, King, University, and Brock. The principal buildings are the city hall, court house, Anglican and Roman Catholic cathedrals, provincial penitentiary, post office, Rockwood Lunatic Asylum, Grand Opera House, Royal Military College buildings, and Queen's University buildings. Fort Henry, which was begun in 1812, is an imposing work, constructed in the old style, but not adapted to resist modern cannon. There are three parks—City park, containing a fine statue of Sir John A. Macdonald, the eminent Canadian statesman, and Frontenac and Victoria parks. Fine churches, built of stone, represent the leading denominations. Kingston is the seat of a Roman Catholic archbishop and an Anglican bishop. The educational institutions include Queen's University (*q. v.*), one of the foremost universities of Canada, attended by nearly 1,000 students of both sexes; the Royal Military College, with 80 cadets, many of whom after graduation receive commissions in the British army; School of Mining, School of Artillery, Provincial Dairy School, and St. Vincent College for Girls. The charitable institutions include, besides the Rockwood Lunatic Asylum, two large hospitals and four homes and orphanages. The city has two daily newspapers, the "British Whig" and the "News," and an able review is published by Queen's University. The leading manufactures are locomotives, woolen, cotton, and leather goods, steam-engines, and pianos. The value of manufactured products for 1906, according to the Dominion census, was $4,389,607, as compared with $2,045,173 in 1901, an increase of 114 per cent. Count Frontenac, the most famous governor of French Canada before the conquest, built a fort here in 1673. The British acquired it in 1762, changed the name of the place to Cataraqui, and after the American Revolution to Kingston. It was the capital of Canada during 1841-44, after the legislative union of Upper and Lower Canada. Pop. (1901) 17,961; est. (1907) 19,450; with suburbs, 21,000.

Kingston, William Henry Giles, an English novelist; born in London, Feb. 28, 1814. He wrote almost, though not quite, exclusively for boys, producing 130 stories in 30 years; mostly of sea voyage and adventure, instructive as well as pleasing, and very popular. "Peter the Whaler" (1851); "The Cruise of the Frolic" (1860); the series beginning with "The Three Midshipmen" (1873); "Joviman" (1877), etc., won hosts of readers, both young and old. His articles on Portugal, where his father was a merchant at Oporto, led to the commercial treaty between Portugal and England in 1842. He died Aug. 2, 1880.

Kingston-upon-Hull, an important and flourishing English river-port, a parliamentary and municipal borough and county of itself; in the East Riding of Yorkshire, in a low, level plain on the Humber (here about 2 miles wide, and joined by the Hull). The docks and basins, comprising an area of upward of 200 acres, have been constructed since 1774. The Victoria Dock (1850-1864) covers 20 acres, exclusive of two large timber ponds and tidal basins which contain an area of about 9 acres; it partly occupies the site of an old citadel with a battery of 21 guns, which till 1864 commanded the entrance of Hull Roads and the Humber. The Albert Dock (24½ acres) was opened in 1869; and the Alexandra Dock (40 acres) in 1883. Hull was one of the first ports in England to engage in the whale-fishery, an enterprise which has been abandoned; but its fisheries for edible fish employ, in conjunction with those of Grimsby, large fleets of boats, attended by steam auxiliaries. Hull is a principal steam-packet station, and ocean steamers ply regularly to many of the principal ports of Belgium, Holland, Denmark, Russia, Germany, and Scandinavia. Its home trade is also very extensive. It is the great outlet for the woolen and cotton goods of the midland counties, with which it has direct communication, by means of railway, river, or canal. It is the chief entrepôt for German and Scandinavian oversea trade. There is also regular steam communication with New York and Boston. Pop. (1901) 238,562; est. (1906) 262,426.

Kingston-upon-Thames, a town of England, County Surrey, on the right bank of

the Thames, 12 miles from Hyde Park Corner. Its antiquity is proved by numerous Roman remains found in its vicinity, and the Saxon kings were crowned here from Edward the Elder to Ethelred II. The stone on which the kings were crowned is preserved within an iron inclosure near the market-place. In the neighborhood are Bushy and Richmond parks and Hampton Court Palace. Pop. (1901) 34,375.

Kingstown, a watering place in Ireland, noted for its fine harbor. Pop. (1901) 17,356.

King Vulture. See CONDOR.

King William's War, a war waged by Great Britain and its colonies in America against France and its Indian allies in 1689–1697. The scenes of carnage and destruction witnessed in the similar wars in America were repeated. Many lives were sacrificed.

Kingwood, a kind of wood from Brazil, called also violet wood. It is obtained from a species of *Triptolomœa,* or, according to some, from *Brya ebenus.* It is used for turning and cabinet work, and is beautifully variegated with violet streaks.

Kinkajou (ka*ng*-kä-zhö′), a genus of carnivorous mammals, family *Procionidæ.* They have prehensile tails, with which they hang on to trees. They have some affinity to the

KINKAJOU.

lemurs, of which they are the partial representatives in the New World, where they occur in South America and in Mexico. The best known species is *Cercoleptes caudivolvulus,* which is about a foot long, with a tail of 18 inches. It feeds upon fruit, insects, and birds. It is seen in menageries, and is occasionally tamed as a pet.

Kinkel, Johann Gottfried (kink′el), a German poet; born in Obercassel, near Bonn, Aug. 11, 1815. His patriotic and stormy life and political martyrdom contrasted oddly with his peaceful writings. His first volume of verse, rich in feeling and charming in simplicity, contained the fine narrative poem "Otto the Archer," which had afterward enormous success printed alone, also serving repeatedly as an opera libretto; his second (1868), more political and much inferior, contained however the exquisite narrative poem "The Blacksmith of Antwerp," one of his best productions. The tragedy "Nimrod" (1857) aimed to depict the rise of despotism. The village tale "Margret" became at once a classic. Of a great prose work he projected, "History of Christian Plastic Art," only the first part, on "Ancient Christian Art," ever appeared (1845). He died in Zürich, Nov. 12, 1882.

Kinless Loons, a name given by the Scotch to the judges sent among them by Cromwell, because they distributed justice impartially without being influenced by family or party ties.

Kinney, Coates, an American writer; born in Yates co., N. Y., in 1826. He was originally a lawyer, afterward editor of the Cincinnati "Times" and the "Ohio State Journal." He wrote: "Ke-u-ka, etc."; "Lyrics of the Ideal and the Real." His best known poem is probably "The Rain on the Roof." He died in 1904.

Kinnikinic, or **Killikinic,** a mixture of the leaves of the sumac and willow which were dried and then finely pulverized, and a little tobacco added, and smoked by the North American Indians. The name is now given to a brand of manufactured tobacco.

Kino, a kind of gum which exudes from certain trees and is dried without artificial heat. There are four varieties imported into the United States, viz., the East Indian or Malabar kino from *Pterocarpus marsupium;* Bengal or Butea kino from *Butea frondosa;* African or Gambia kino from *P. erinaceus;* and Australian, Botany Bay, or Eucalyptus kino from *Eucalyptus rostrata.* It consists of dark red angular fragments, rarely larger than a pea, and easily splitting into still smaller pieces. In cold water they sink, partly dissolving, and forming a very astringent solution. It is very soluble in spirits of wine, affording a dark reddish, slightly acid solution. In its general behavior kino closely resembles catechu, and yields by similar treatment the same products. It is administered in medicine as an astringent. Also the inspissated juice of various plants. It is brought to this country in small angular pieces, constituting broken reddish black tears, ruby red at the edges, shining and brittle, in powder a dark red. Compound powder of kino and tincture of kino are powerful astringents. It is given in pyrosis and diarrhœa, as an injection in urethral catarrh or gonorrhœa, and as a gargle in relaxed throat; sometimes also it is chewed.

Kinsale, a municipal borough and seaport of County Cork, Ireland. In 1601, 3,000 Spaniards landed at Kinsale in order to fight for the O'Neill confederacy. Here James II. landed on March 12, 1689, and here he reëmbarked in July, 1690. In the

following October the fort was captured by Marlborough.

Kintyre. See CANTYRE.

Kiosk, a kind of open pavilion or summer-house, constructed of wood, straw, etc., and supported on pillars, surrounded by a balustrade. They are used in gardens, parks, etc., and in Paris and other continental cities as depots for the sale of papers.

Kioto, for over 1,000 years the capital of Japan; situated on a flat plain about 26 miles inland from Ozaka. A high range of hills to the E. separates this plain from Lake Biwa, and on these some of the finest temples connected with the city are built. The city is rectangular in form, the longer streets running N. and S., parallel to the Kamo river, which flows along the base of the ridge. At the N. end are situated in an enclosure the plain wooden buildings where the emperors of Japan dwelt so long in seclusion. The Honganji temples of the Monto sect of Buddhists, fine structures of their kind and the center of the Buddhist faith in Japan, rise at the S. end of the city. The streets, tnough narrow, are clean and attractive, and the whole city has an air of refinement. The singing girls of Kiōto are noted for their graceful dances. The pottery, porcelain, crapes, velvets, and brocades of Kiōto are highly esteemed; its embroideries, enamels, and inlaid bronze-works are marvels of skillful handicraft. Pop. (1903) 380,568.

Kiowan, a linguistic stock of North American Indians of which but one tribe, the Kiowa, remains. They lived near the head waters of the Upper Platte and were very aggressive. They are now quite insignificant.

Kip, Leonard, an American author; born in New York city, Sept. 13, 1826; was graduated at Trinity College in 1846; admitted to the bar and practised in Albany, N. Y.; and for 10 years was president of the Albany Institute. He is author of "California Sketches" (1850); "Volcano Diggings" (1855); "Æone" (1866); "Nestlenook" (1880); etc.; besides many magazine articles. He died Feb. 15, 1906.

Kip, William Ingraham, an American clergyman; born in New York city, Oct. 3, 1811; was graduated at Yale College in 1831; and later at the General Theological Seminary; ordained in the Protestant Episcopal Church in 1835; and elected Bishop of California in 1857. He was author of the "Lenten Fast" (1843); "Early Conflicts of Christianity" (1850); "Olden Times in New York" (1872); "Early Days of my Episcopate" (1892); etc. He died in San Francisco, Cal., April 7, 1893.

Kipchaks, or **Kiptchaks,** a Turkic people who in the eleventh century overran Southern Russia, between the Ural and the Don, N. of the river Kuma. After the death of Genghis Khan, his grandson, Batu Khan, conquered (1238-1243) nearly all Central and Southern Russia, and founded the great empire of the Golden Horde or the Kipchaks, fixing his magnificent camp on the Volga. They gradually acquired the rudiments of civilization as they came into contact with the cultured peoples of the West and South. The Golden Horde and the E. branch, the White Horde or Eastern Kipchak, were united about 1378; but this joint empire was broken up by Tamerlane in 1390–1395. Out of the fragments were formed the small khanates of Astrakhan, Kazan, the Crimea, etc., all of which were eventually absorbed by Russia. The modern descendants of the Western Kipchaks are the Tartars of Kazan, Astrakhan, the Crimea, etc.

Kipling, Rudyard, an English author; born in Bombay, Dec. 30, 1865. He was educated in England, and in 1882 went out to India and joined the staff of the "Civil

RUDYARD KIPLING.

and Military Gazette," Lahore, for which paper his earlier tales were written. He depicted Anglo-Indian and military life in "Soldiers Three," "Black and White," "Plain Tales from the Hills," "Story of the Gadsbys," "Life's Handicap," etc. "The Naulakha," published in 1891, and written in collaboration with Wolcott Balestier, is not of such high merit as the work that is all his own. "Many Inventions," a collection of stories, appeared during 1893, and a good deal of verse in various magazines. In 1894 "The Jungle Book" was published, followed by "The Second Jungle Book." His first book of verse, "Barrack Room Ballads," appeared in 1892, and in 1896 another volume, "The Seven Seas." In 1897 he published "Captains Courageous," in 1898 "The Day's Work," in 1900 "From Sea to Sea"; and in 1901 "Kim." Among his most popular poems

are: "The Vampire," "Recessional," "The Truce of the Bear," and "The White Man's Burden." On his visit to the United States in 1899 Mr. Kipling was taken ill with pneumonia, and for a time his life was despaired of, but he finally rallied and again began his literary work. His illness was the occasion of universal expressions of sympathy and esteem.

Kirby, William, an English entomologist; born in Witnesham Hall, Suffolk, Sept. 19, 1759. He was educated at Ipswich grammar school and Caius College, Cambridge. His principal works are: "Monographia Apum Angliæ," and "Introduction to Entomology." He died in Barham, July 4, 1850.

Kirby, William, a Canadian author; born in Kingston-upon-Hull, England, Oct. 3, 1817; removed to Canada in 1832; was educated in Cincinnati, O.; and in 1839 removed to Niagara, Ont., where he was editor and publisher of the "Mail" for 20 years. He is the author of "U. E., a Tale of Upper Canada" (a poem, 1860); "Chien D'Or"; "Beaumanoir"; "Joseph in Egypt," etc. He died in 1906.

Kirchbach, Wolfgang (kir*h*'bä*h*), a German author; born in London, Sept. 18, 1857. Of his numerous works especially noticeable were: "Salvator Rosa" (1880), a novel; "Children of the Kingdom" (1883), "a novel cycle"; "Selected Poems" (1883); "Waiblinger" (1886), a modern tragedy; "The Judge of Men" (1888), a comedy. He filled various editorial positions at Dresden.

Kirchentag (kēr*h*'en-täg), a Protestant association founded in Germany in 1848, and composed of ministers and laymen of the Lutheran, German Reformed, United Evangelical, and Moravian Churches. It is of the nature of the Evangelical Alliance, but takes a wider range of subjects, embracing questions of social reform as well as those of a more strictly religious nature. The inner mission is specially patronized by it. Its doctrinal basis rests upon the confessions of the 16th century. It holds an annual meeting, the place of which is changed from year to year. The first meeting took place in 1848 at Wittenberg, in the church to which Luther affixed his theses. It is possessed of no legislative power.

Kirchhoff, Theodor (kir*h*'hof), a German-American poet; born in Ütersen, Jan. 8, 1828. Residing in the United States, he wrote in German and published in Germany. With his brother Christian he published "Songs of War and Love" (1864), and another volume of poems, "Adelpha" (1869). Alone he wrote: "Pictures of Travel and Sketches from America" (2 vols, 1875–1876); "Ballads and Recent Poems" (1883); "Pictures of Californian Civilization" (1886); "A Trip to Hawaii" (1890).

Kirghiz (kēr'gēz), a nomadic Mongol-Tartar race, numbering in its various branches about 3,000,000, and inhabiting the steppes that extend from the lower Volga and the Caspian Sea in the W. to the Altai and Thian-Shan Mountains in the E., and from the Sea of Aral and the Syr Daria in the S. to the Tobol and Irtish on the N. The Kirghiz are a slow, sullen people, small in stature, bad walkers, but born riders. Their food is chiefly mutton and horseflesh, and their drink the nourishing fermented mare's milk called *koumiss*. They dwell in a *yurt* or semi-circular tent, the wooden framework of which is covered with cloth or felt. Agriculture is almost unknown; their possessions are in sheep, horses, and camels, and their manufactures consist of cloth, felt, carpets, leather, etc. They profess Mohammedanism. Most of the varied Kirghiz tribes are, at least nominally, under Russian government.

Kirin, capital of the province of Kirin, in Manchuria, on the river Sungari. It has an arsenal and powder factory. Pop. 75,000 to 100,000.

Kirjatharba. See HEBRON.

Kirk, Ellen Warner Olney, an American author; born in Southington, Conn., Nov. 6, 1842; daughter of Jesse Olney; was educated in Stratford, Conn., and married John Foster Kirk in 1879. Besides short stories and essays she is the author of "Lost in Idleness" (1877); "A Midsummer Madness" (1884); "The Story of Laurence Garth (1895); "Dorothy Dean" (1899); etc.

Kirk, John Foster, an American author; born in Frederickton, N. B., March 22, 1824; received an academic education in Halifax, N. S., came to the United States in 1842 and settled in Boston. He contributed largely to "The North American Review"; "The Atlantic Monthly," and other periodicals; removed to Philadelphia, Pa., in 1870, where he was editor of "Lippincott's Magazine" till 1886; and was lecturer on history in the University of Pennsylvania in 1885–1888. He is the author of "History of Charles the Bold"; and editor of the complete works of William H. Prescott, and "Supplement" to "Allibone's Dictionary of Authors." He died in 1904.

Kirkbride Thomas Story, an American psychopath; born in Morrisville, Pa., July 31, 1809. He was for years in charge of hospitals for the insane in Philadelphia and wrote important monographs on mental aberration. He died in Philadelphia, Pa., Dec. 16, 1883.

Kirkdale Cave, in the vale of Pickering, Yorkshire, England, is famous for the nu-

merous remains of Tertiary mammals which have been found in it. It was discovered in 1821.

Kirke, Sir David, an English colonial adventurer; born in Dieppe, France, in 1596. He was prominent in colonial enterprises in Canada and was made governor of Newfoundland. He died in Ferryland, Newfoundland, in 1656.

Kirke, Percy, an English officer who had served for some years in Tangiers, and whose men after the defeat of Sedgemoor (1685) inflicted fearful atrocities upon the unhappy followers of Monmouth and their suspected sympathizers, as to make their nickname, "Kirke's Lambs," a byword for cruelty. Kirke early deserted to William's side and helped to raise the siege of Londonderry.

Kirkland, Caroline Matilda Stansbury, an American author; born in New York city, Jan. 12, 1801; settled in Clinton, N. Y., where she married William Kirkland. In 1842 she established a girls' boarding-school; contributed to annuals and magazines, and was editor of the "Union Magazine." Her works include "A New Home; Who'll Follow?" (1839); "Western Clearings" (1846); "The Helping Hand" (1853); "Memoirs of Washington" (1857); and "The Destiny of Our Country" (1864). She died in New York city, April 6, 1864.

Kirkland, John Thornton, an American clergyman; born in Herkimer, N. Y., Aug. 17, 1770; was graduated at Harvard College in 1789; studied theology in Stockbridge, Mass., and later at Harvard College, where he was tutor in metaphysics while preparing for the ministry. He was ordained and installed minister in the New South (Unitarian) Church in 1794, remaining there until 1810, when he was elected president of Harvard College. During his term of office (17 years) the course of study was greatly enlarged, the law school was established, and other departments improved. Among his publications are "Eulogy on Washington" (1799); "Biography of Fisher Ames" (1809); and "Discourse on the Death of Hon. George Cabot" (1823). He died in Boston, Mass., April 24, 1840.

Kirkland, Joseph, an American author; born in Geneva, N. Y., Jan. 7, 1830; received a common school education; removed to Chicago, Ill., in 1853; entered the volunteer service at the outbreak of the Civil War, serving as private, lieutenant, and captain in the 12th Illinois Volunteer Infantry; was promoted major in 1863; and served in the Army of the Potomac. After the war he engaged in mining, law practice, and later in literary work. His publications include: "Zury, the Meanest Man in Spring County" (1887); "The Captain of Company K" (1891); with Caroline Kirkland, "The Chicago Massacre of 1812"; and "The Story of Chicago" (1892–1894). He died in Chicago, Ill., April 29, 1894.

Kirkpatrick, Sir George Airey, a Canadian statesman; born in Kingston, Ontario, Sept. 13, 1841. He served in the Dominion Parliament from 1870 to 1891 and was for three years Speaker of the House. In 1891 he was made lieutenant-governor of Ontario. He died in 1899.

Kirk Session, the lowest or initiatory court of the Established Church of Scotland. It consists of an ordained minister, generally the incumbent, who presides under the name of moderator, and the elders of the congregation, of whom two must be present to form a quorum. It takes cognizance of matters spiritual and of general ecclesiastical discipline within the congregation. Other Presbyterian churches have a court of the same nature.

Kirkstall Abbey, a Cistercian abbey in Yorkshire, England; 3 miles N. W. of Leeds, in the midst of modern manufacturing establishments. Next after Fountains Abbey, it is the best-preserved monastic ruin in the county. First founded at Barnoldswick in the same neighborhood in 1147, but five years later moved to its present site, the abbey is mainly Transition Norman and Perpendicular in style. The church is, like most Cistercian churches, long and narrow, with little ornamentation and a low tower. The abbey was presented to the town by Colonel North in 1889.

Kirmoab (kēr-mō'ab), a fortified city of Palestine, in the territory of Moab, mentioned in Isaiah xv : 1, was noticed in an act of the Council of Jerusalem in 536. In 1131, Fulk, Count of Anjou, and Latin king of Jerusalem, erected a castle here which successfully resisted a siege by Saladin in 1183.

Kirwan. See MURRAY, NICHOLAS.

Kirwanite, a soft, fibrous, green mineral, found in the basalt of Antrim, Ireland. Composition: A hydrated silicate of alumina, protoxide of iron and lime.

Kisfaludy, Károly (kish'fa-lö'dē), a Hungarian dramatist; brother of Sandor; born in Tét (Raab), Feb. 5, 1788. He was the father of modern Hungarian drama. His noblest tragedy, "Irene" (1820), has scarcely a peer in Hungarian literature. Next comes the fragment "Matthew Csák"; overwork on which, injuring his health, compelled him to leave it unfinished. His comedies excelled his tragedies; among the best of them were: "The Rebels," "The Murderer," "Illusions," all bright pictures of modern Hungarian life. He was successful as a lyric poet also; and as a novelist, particularly a humorous one. Soon after his death a Kisfaludy Society was

formed in Hungary in support of the national Muse. He died Nov. 11, 1830.

Kisfaludy, Sándor, a Hungarian poet; born in Sümeg (Zala), Sept. 27, 1772. He was the first great poet of modern Hungary. His masterpiece was "Himfy's Love Songs" (1801–1807), in two parts, "Love Unrequited" and "Love Returned"—the former being the better, and both showing the influence of Petrarch. His other important work was the epic "Legends from the Magyar Past" (1807–1838), which also contained many love songs. He was the poet of the aristocracy, as Csokonai was of the people. A memorial to him was erected at Lake Platten in 1860. He died Oct. 28, 1844.

Kishineff, capital of the Russian province of Bessarabia, on a tributary of the Dniester. When it came into the possession of Russia in 1812, it was a place of only 7,000 inhabitants; since then, however, it has rapidly increased in size and prosperity. The old or lower town abuts upon the river; the new town stands on cliffs between 400 and 500 feet above the river. Fruit, the vine, and tobacco are grown; and tobacco and flour are manufactured. Kishineff is an important trading center for Bessarabian native products. It is the seat of an archbishop and has a theological seminary. Pop. (1897) 108,796.

Early in the morning of Easter Sunday (April 19) 1903, soon after the exodus from the midnight services in the Russian churches, a mob of workmen began to break open the Jewish shops on one of the principal streets of the town, and by night several streets had been wrecked from end to end. The rioting was renewed on Monday, but the arrival of troops in the afternoon restored order. It was estimated that from 50 to 120 Jews had been killed outright and from 400 to 500 seriously injured; that 4,000 families had been ruined financially; and that property valued at several million dollars had been destroyed, more than three-fourths of the town having been reduced to ruin. Various causes of the rioting were reported, among them discontent with the government, hatred of the Jews, and a groundless rumor that the Jews had killed a Christian boy to obtain human blood for their Passover ceremonies. The rioting excited the indignation of the civilized world. In the United States, whence large contributions of money were sent to the sufferers, President Roosevelt received the Executive Council of the order of B'nai B'rith (June 14), who presented him a petition, signed not only by the most influential Jews in the country but by hundreds of Christians and eminent citizens, with a request that he forward it to the Czar. The President agreed to comply with the request if it should be found practicable; but on July 17 Secretary Hay announced that the Russian Government declined to receive or consider the petition. The moral effect of the effort, however, was not lost, as the text of the petition was widely published. The special court which tried some of the alleged rioters in December denied that the outrages were of anti-Semitic origin, sentenced 25 persons to from six months' to seven years' imprisonment, and dismissed 48 civil actions brought by Jews.

Kiss, August, a German sculptor; born in Pless, Upper Silesia, Oct. 11, 1802. His group "The Amazon and the Panther" is famous. He died in Berlin, March 24, 1865.

Kiss, Josef, a Hungarian poet; born in Temesvár in 1843. He is exclusively modern in subjects and treatment, but with a strain of melancholy. His "Song of the Sewing Machine" (1884), a glorification of work and a noble eulogy on woman, and "A Grave" (his mother's), are notable. A fourth edition of his "Poetical Works" appeared in 1890; "New Poems" in 1891. After 1890 he was editor of "The Week," a literary journal.

Kissingen, a watering-place of Bavaria, Germany, on the Saale, 30 miles N. of Würzburg. The springs, five in number, and all saline, contain a large quantity of carbonic acid gas, and are used both internally and as baths. Besides 13,000 visitors annually attracted by the baths, about 500,000 bottles of water are annually exported. A complete course of water drinking and bathing occupies 28 days.

Kistna, a river of Southern India, rises in the Western Ghâts within 40 miles of the Arabian Sea, at a height of 4,500 feet, and, flowing E. across the peninsula, falls into the Bay of Bengal after a course of 800 miles; area of drainage basin, 97,050 square miles. The river forms for a considerable distance the boundary between the Nizam's dominions and Madras presidency, and has a delta extending 100 miles inland. It is only navigable for about 50 miles during six months of the year. Its valley has a fine system of irrigation.

Kistnerappan (kist-ner-äp'pän), the Indian water-god. Persons at the point of death are sometimes carried into the Ganges, and sometimes to its banks, that Kistnerappan may purify them from all defilement before they die. Others have a little water poured into the palms of their hands, with the same object.

Kit-Cat Club, a society formed in London about 1700, consisting of 39 noblemen and gentlemen favorable to the succession of the House of Hanover, and whose ostensible object was the encouragement of literature and the fine arts. Jacob Tonson, an eminent publisher, was founder and secre-

tary; and not to mention dukes and earls, it included Sir Robert Walpole, Vanbrugh, Congreve, Addison, Steele, and Garth. The club derived its name from having met for some time in the house of Christopher Catt, a pastrycook, though some explain its origin as due to the sign of the Cat and Fiddle. Before the club was dissolved (about 1720) each of the members presented to Tonson his half-length portrait, painted a uniform size, by Sir Godfrey Kneller. Hence the term is now applied generally to any portrait of kit-cat size—*i. e.*, about 36 inches long by 28 or 29 wide.

Kitchen Cabinet, a name applied to certain intimate political friends of President Andrew Jackson, who were said to have more influence with him than his cabinet.

Kitchener, Horatio Herbert, Viscount and Baron Kitchener of Khartum, a British military officer; eldest son of Lieutenant-Colonel H. H. Kitchener of the 13th Dragoons; born in June, 1850. He was educated at the Royal Military Academy, Woolwich, and entered the Royal Engineers as a lieutenant in 1871, having already seen some active service on the French side in the war of 1870–1871. In 1874–1878 he was engaged on the survey of Palestine under the auspices of the Palestine Exploration Fund Committee, and in 1878–1882, except for a short period as vice-consul in Anatolia, he carried out a survey of the island of Cyprus. In 1882 he volunteered for service under Sir Evelyn Wood in Egypt, and was at once appointed to a cavalry command. He served in the Nile expedition of 1884–1885, and was mentioned in the dispatches. For his services in the field on the staff as deputy-assistant adjutant-general of the Intelligence Department he was made a brevet lieutenant-colonel and received the khedive's star and the second-class Medjidie. He was governor of Suakin in 1886–1888, and distinguished himself in the latter year by the bravery and skill with which he led the Egyptian troops against Osman Digna at Handoub. In 1889 he was in command of mounted troops on the Sudan frontier, and for his bravery, especially in the action at Toski, he was mentioned in dispatches and created a Companion of the Bath.

From 1888 till 1892 he was adjutant-general and second in command of the Egyptian army, and on the retirement of Sir Francis Grenfell in 1892 he became Sirdar. He commanded the Anglo-Egyptian force which recovered Dongola for Egypt in 1896 and his services were rewarded by promotion to the rank of Major-General. He was also made K. C. B. and awarded the first-class Osmanieh order. Soon afterward he led another expeditionary force up the Nile valley, and having inflicted a severe defeat on the Khalifa's forces at the Atbara river on Good Friday, 1898, he utterly destroyed his power by the battle of Omdurman on Sept. 2 of that year. For this crowning triumph he was raised to the peerage (1898) as Baron Kitchener of Khartum and Aspall, in the county of Suffolk, receiving also the formal thanks of Parliament and a grant of £30,000.

He was appointed governor-general and commander-in-chief of the Egyptian Sudan in 1899, but he resigned this post and that of Sirdar of the Egyptian army in the latter part of the same year, in order to accompany Lord Roberts to South Africa as chief of his staff in the war with the Boers. When Lord Roberts left South Africa toward the end of 1900 to become commander-in-chief at home, Lord Kitchener succeeded him as commander-in-chief of the forces in South Africa, where he continued in the supreme direction of the operations carried on against the Boers. On the termination of the war in 1902, Lord Kitchener was created a viscount by King Edward, voted a grant of £50,000 by Parliament, promoted to general, awarded the decoration of the Order of Merit, given an enthusiastic reception on his return to London, and made commander-in-chief in India (1902-1909). The Gordon College in Khartum was proposed by Lord Kitchener as a memorial of the ill-fated General Gordon. He was created G. C. B. in 1898, C. M. G. in 1886, and K. C. M. G. in 1894; and in 1899 Oxford University conferred upon him the honorary degree of D. C. L.

LORD KITCHENER.

Kite, a name applied to very active long-winged, small-footed *Falconidæ* with rather short beaks, never truly notched like those of falcons. They fly strongly and gracefully. The typical genus is *Milvus,* confined to the Old World, and represented

by half a dozen species. Of these the common or red kite (*Milvus ictinus*), the Anglo-Saxon *Gled* or *Glead*, used to be common in Great Britain, but is now very rare. Till the time of Henry VIII. or so it was abundant on the London streets, devouring the offal in the midst of the people. The bird measures two feet in length and is predominantly rufous. It is generally distributed in Europe and round about the Mediterranean shores. Its nest is built on a tree and made up of sticks and rubbish. The eggs (three) are laid in April or May, and have a dull-white or pale-blue ground, with spots or blotches of reddish brown. The bird feeds on offal and small vertebrates of all kinds, and may be destructive to young game and poultry. The black kite (*M. migrans*) has been recorded in Great Britain; the pariah kite (*M. govinda*) of India is a useful scavenger; *M. isurus* inhabits Australia. Under the title kite are also included the black-winged kites (*Elanus*) of both hemispheres; the beautiful swallow-tailed kite (*Elanoides forficatus*), occurring in the warmer parts of North America; the hook-billed kite (*Rostrhamus*) of South America and Florida, feeding, curiously enough, on fresh-water snails; and the large bee-kite or honey buzzard (*Pernis apivorus*), inhabiting Europe and Africa.

Kite, a wind toy, controlled by a string. As a plaything the kite has been known since 400 B. C., and in its familiar form of two crossed sticks covered with paper, and balanced with a tail of string, on which are tied bits of cloth or paper, is a common sight. Kites were first employed in aid of science in 1749, by Dr. Alexander Wilson and Thomas Mellville, of Scotland, who by means of a thermometer attached to a kite, were able to take temperatures above the earth's surface. Franklin's experiments with electricity by means of a kite and key are familiar to everyone. In more recent times kites are being made to serve, not only the peaceful ends of science, but the needs of modern warfare, and many experiments have been made on these lines. Among the men who have given much thought and labor in this direction are W. A. Eddy, S. P. Langley, Octave Chanute, Lawrence Hargrave, J. B. Millet, J. W. Davis, C. F. Lamson, H. D. Wise, Captain Baden-Powell, and others. The first improvement was to make a tailless kite, and this was perfected by Mr. Eddy.

In 1895 Captain Baden-Powell, of England, weighing 150 pounds, was enabled to hoist himself 100 feet in the air by a tandem of five kites. Mr. Hargrave, with three kites, raised a total weight of 208 pounds to the height of 16 feet, as far as he cared to go. Lieutenant Wise, in 1897, with four kites, rose to 42 feet, the entire weight raised being 229 pounds. Mr. Eddy has done much to develop tandem kite flying. In 1897 he made a tandem of nine Eddy-Malay kites on a cord two miles long, with an elevation of 5,595 feet, the same being kept up for 15 hours. At Blue Hill Observatory, near Boston, this height was exceeded, the tandem of seven Malay and two Hargrave kites, with an area of 170 feet, rising 8,740 feet above Blue Hill, or 9,375 feet above sea-level. It took 3 miles of piano-wire and the work of three men for 12 hours to accomplish this feat. Piano wire has been found preferable to cord, having greater tensile strength and presenting less surface to the wind. In the United States weather bureau parakites are used for the purpose of recording the velocity of the wind, and the humidity and temperature at high altitudes, by the meteorograph. These can be obtained at a single observation and several hours before the effects are known in the lower atmosphere. The parakites may be put to several uses in time of war. They can, by means of colored electric lights or lanterns controlled by the cord or electric wire, convey signals to the troops, or they may be made to drop explosive substances on the heads of the enemy. Photographs have been taken by means of a camera fastened on the frame of a kite and operated by a cord, and Mr. Eddy has an arrangement of eight cameras strapped together in which all the shutters can be opened at once, and by this means a complete view of the horizon can be taken. Inventors of flying and soaring machines have made extensive use of kites in planning the construction of their various contrivances.

Kittatinny Mountains, sometimes called the BLUE MOUNTAINS, an extensive range of mountains in the United States, which can be traced with but slight breaks from Ulster co., N. Y., through New Jersey, Pennsylvania, Maryland, Virginia, North Carolina and Georgia, into Alabama. They are over 800 miles in length, with an elevation of from 800 to 2,500 feet.

Kittiwake, a gull, *Larus tridactylus*, so called because the fourth toe is only a small tubercle without any projecting horny nail or claw. Length, 15½ inches; head, neck, and undersurface white; back and wings, French gray; legs short and dusky; toes and interdigital membranes dusky. Found in the highest latitudes and as far S. as Tripoli.

Kitto, John, an English writer on Biblical subjects; born in Plymouth, England, Dec. 4, 1804. In his 12th year he lost his power of hearing in consequence of a fall from a height of 35 feet. His father's circumstances were at this time so wretched that young Kitto was soon after sent to the workhouse, where he learned the trade of shoemaking. In 1824 he went to Exeter to

learn dentistry with a Mr. Grove, who encouraged him in his literary aspirations; and in 1825 he published "Essays and Letters by John Kitto." In the same year he was sent to the Missionary College at Islington, where he learned printing. In 1829–1833 he accompanied Mr. Grove and family on a tour to the East, visiting in the course of his travels St. Petersburg, Astrakhan, the Caucasus, Armenia, and Persia. The rest of his life was spent in the service of the publishers, chiefly in that of Charles Knight, whose failure led to less constant employment and pecuniary embarrassments. In 1850 he received a civil list pension of $500 a year. His principal works are "The Pictorial Bible," "Pictorial History of Palestine" "History of Palestine," "The Lost Senses — Deafness and Blindness," "Journal of Sacred Literature," and "Daily Bible Illustrations." Stricken with paralysis, he died in Cannstadt, Würtemberg, Nov. 25, 1854.

Kitt's, St., or **Saint Christopher,** an island of the Leeward group, West Indies, belonging to Great Britain; area about 100 square miles; surface, diversified, a mountainous ridge extending through the center from N. to S., and at Mount Misery (an extinct volcano), rising to an elevation of 3,711 feet. The soil is very fertile, and produces all the tropical fruits. The climate is dry and salubrious. Capital, Basseterre. Discovered by Columbus in 1493. Pop. (1901) 29,782.

Kiu-Kiang, a seaport of China, province Kiangsi, on the S. bank of the Yang-tse-kiang. Its situation is not favorable for an extensive commercial port, but it derives importance from its connection with the green-tea districts. The port was opened to foreign trade in 1862, when the population was 10,000; in 1905 it was 36,000.

Kiusiu, one of the three principal islands of Japan, separated from Korea by the Strait of Korea, and from Hondo by the Strait of Sikoku. Nagasaki is situated here.

Kizil-Irmak, the Turkish "Red River," a river known to the ancients as the Halys, the principal river of Asia Minor. Rising in the E. of the peninsula, it flows in a circuitous route for about 500 miles and enters the Black Sea near Sinope.

Kizil-Kum ("Red Sands"), a sandy desert in Russian Turkestan, between the lower courses of the Amu-Daria and Syr-Daria. They stretch S. E. from the Sea of Aral, and rise from an elevation of 150 feet at the sea to 2,000 toward Bokhara. They are partly of shifting nature and partly stationary, and are diversified by numerous undulations or ridges of sand, between which extensive patches of clay occur. N. E. of the Caspian stretches the Kara-Kum "black sands" desert, a former bed of the sea.

Kjerkegaard. See KIERKEGAARD.

Kjerulf, Halfdan (kyer'ulf), a Norwegian composer; born in Christiania, Sept. 15, 1815; studied law, but devoted himself to music. He wrote much for the piano, but is best known for his charming songs, full of melody and true Norwegian feeling. He died Aug. 11, 1868.

Klaczko, Julian (klach'kō), a Polish statesman and historical writer; born Nov. 6, 1828, of Hebrew parents. He was at one time a prominent member of the Austrian Landtag, and was a voluminous writer on historical and political subjects in Polish, French, and German. Chief among his publications are: "The Polish School" (1854); "The Unitarian Agitation in Germany" (1862); "Studies in Contemporary Diplomacy" (1866); "The Preliminaries of Sadowa" (1869); "The Two Chancellors" (1786), a study of Bismarck and Gortchakoff; "Florentine Causeries"; "Dante and Michael Angelo."

Klamath, the appellation of several tribes of North American Indians formerly living along the Klamath river in Oregon and California, but now settled on a reservation at Klamath Lake.

Klamath (klä'mat) **Lake,** a body of water in Oregon, at the E. base of the Cascade Range; overlaps the S. boundary of the State into California. The lake is about 44 miles long by 6 to 14 miles wide. It consists of two considerable bodies of water, connected by a narrow strait less than 2 miles wide. Klamath river is the outlet, and issues from the S. end, or Lower Klamath Lake.

Klapka, George, a Hungarian soldier; born in Temesvar, April 7, 1820. He rose to the rank of Lieutenant-General in the Austrian army, but on the outbreak of the revolution placed himself at the service of the Hungarian government and took a prominent part in nearly all the battles against the Austrians between February and August; in more than one the fortune of the day was decided by the troops under his command. But the crowning glory of his career was his defense of Komorn, which he continued to hold for some weeks after all the rest of Hungary had submitted. He lived in exile till the amnesty of 1867 permitted him to return home. Klapka wrote, among other works, "The National War in Hungary and Transylvania" (1851), one of the best works on the subject; "The War in the East" (1855); and two series of "Memoirs" (1850 and 1886). He died in Budapest, May 17, 1892.

Klapp, Michael (kläpp), a German dramatist; born in Prague in 1834. He was a successful writer of comedies, of

which one of the best known was "Rosenkrantz and Guildenstern" (1878). Others were: "The Blank Lottery"; "Miss Councillor of Commerce." "The Bank Barons" (2 vols. 1877) deserves mention. He died in Vienna, Feb. 25, 1888.

Klaproth, Heinrich Julius von (kläp'-rōt), a German Orientalist; born in Berlin, Prussia, Oct. 11, 1783. He was sent by the Russian government on a mission to Central Asia and acquired valuable information concerning Oriental languages and customs. In 1815 he took up his residence at Paris, at the same time holding a nominal professorship at the University of Berlin. Among his numerous works are: "Travels in Caucasus and Georgia" (1812–1814); "Geographico-Historical Description of Eastern Caucasus" (1814); "Asia Polyglotto" (1823–1829); "Historical View of Asia" (1824). He died in Paris, France, Aug. 20, 1835.

Klausenburg (Hungarian Kolozsvár), one of the chief cities in Transylvania; 95 miles E. by S. from Grosswardein. It consists of the inner town, formerly fortified, and of five suburbs. Here are a university, with four faculties (founded in 1872), and a Unitarian College, both with libraries, an observatory, a music school, and numerous other educational establishments. The town possesses the national museum, with antiquities, scientific collections, and a library of 45,000 volumes. Klausenburg was captured by the Hungarians under Bem on Christmas day, 1848. Machines, oil, and spirits are manufactured. Pop. (1900) 49,295.

Klausthal, the chief mining town of the Northern Harz mountains, Germany; on a bleak plateau (1,985 feet), 25 miles N. E. of Göttingen. The ores mined are silver, lead, copper, and zinc. There is a good mining academy, with library, museum, and laboratory. Zellerfeld, divided from Klausthal by a brook, is also a mining center. The mines are the property of the Prussian government, and one is 2,000 feet below the level of the Baltic. Pop. (1900) Klausthal, 8,565; with Zellerfeld, 12,961.

Kleber, Jean Baptiste, a French general; born in Strasburg in 1754. He was originally an architect, but preferred the military profession, and entered into the Austrian service, in which he remained from 1776 to 1783. When the French revolutionary war broke out, he entered as a grenadier into a volunteer regiment of his native department, and rose rapidly into command. He displayed great skill and bravery at the siege of Mentz, after which he was employed in La Vendée; but the sanguinary scenes there so disgusted him, that he obtained his recall, and was engaged in the army of the North, defeated the Austrians, took Mons, and drove the enemy from Louvain. He also captured Maestricht and contributed to the splendid successes which distinguished the campaigns of 1795 and 1796 on the Rhine. The Directory gave him command of the army of the Sambre and Meuse, which he resigned to Hoche, and for a time retired from the service. Napoleon I., however, who well knew the value of his talents, prevailed upon him to join the expedition to Egypt. He was wounded at the battle of Alexandria, but he marched into Syria, where he commanded the corps of observation during the siege of Acre and defeated the Turks in several actions. When Napoleon left Egypt, he appointed Kleber commander-in-chief of the army; and though, under the then existing

JEAN B. KLEBER.

circumstances, no situation could be more difficult or disheartening, yet he maintained himself successfully against the enemy, captured the city of Cairo, and made an alliance with Murad Bey; but in the midst of new preparations which he was making for securing possession of the country he was assassinated by an Arab, June 14, 1800.

Kleenboc, a pigmy antelope found at the Cape of Good Hope. It is about a foot high at the shoulder, with small erect black horns, somewhat approaching at the tips.

Klein, Julius Leopold (klīn), a German dramatist; born in Miskolcz, Hungary, in 1810. Prominent among his dramas were the historical tragedies "Marie de Médicis" (1841); second part, "Luines" (1842); "Zenobia" (1847); "Strafford" (1862); among his comedies, "The Duchess" (1848); "A Protégé" (1850); "Voltaire" (1862). Of his dramatic work it has been said that it shows him to be a man of talent working by a mistaken method. His celebrated "History of the Drama" (13 vols. 1865–1876; index 1886)—a production of vast

scope, research, and industry — aimed to give the dramatic history of all peoples, but was unfinished at his death. He died in Berlin, Prussia, Aug. 2, 1876.

Kleist, Heinrich von, a German dramatist; born in Frankfort-on-the-Oder, Oct. 18, 1777. At first he followed the family profession and entered the army; but left it in 1799 to study, yet he soon abandoned science for literature. As a writer his aims and desires outran his ability to execute, and his works are marred by want of clearness and artistic completeness; in fact he has some of the worst faults of the Romantic school, to which he belongs. Nevertheless his best plays, such as "The Prince of Homburg" and "The Broken Pitcher" possess sufficient vigor and fidelity to life to make them popular even at the present day. The best of his tales is "Michael Kohlhaas," a story of Brandenburg in the Middle Ages. The morbid tendencies in his character made him quail before the adversities against which he had to battle, and at last brought him to a suicide's grave. He shot himself, after first shooting a woman whom he loved, and who like him was weary of life, on the bank of Lake Wan near Potsdam, Nov. 21, 1811. His works did not gain recognition till after his death; they were first made known by Tieck.

HEINRICH VON KLEIST.

Klemm, Friedrich Gustav (klem), a German historian; born in Chemnitz, Nov. 12, 1802. Having studied in Leipsic, he settled in 1825 in Dresden, where he became royal librarian (1852), retaining that post till 1864. Of special value are his historical works, such as: "Attila according to History, Sagas, and Legends" (1825); "History of Bavaria" (1828); "Handbook of German Archæology" (1835); "Italica" (1839), Italian travels; "General History of Civilization" (10 vols. 1843–1852); "Science of Civilization" (1854–1855); "Women" (6 vols. 1854–1859). He died in Dresden, Aug. 26, 1867.

Kleomenes. See CLEOMENES.

Kleon. See CLEON.

Klephts (klefts), properly "robbers," the name formerly given to those Greeks who kept themselves free from the Turkish yoke in the mountains and carried on a perpetual war against the oppressors of their country.

Kleptomania, supposed species of insanity manifesting itself in a desire to pilfer. In admitting the plea of kleptomania great caution is needed. The best way to arrive at a judgment is to consider the previous character and personal interests of the person charged; to determine the value and usefulness of the article appropriated; the methods of the appropriation and its probable motive. Thus when a baronet steals broken crockery, and a clergyman purloins innumerable cheap Bibles, the ordinary motives for theft are inapplicable, and when the article is taken ostentatiously there is then a strong case in favor of kleptomania. When this is established the person so affected must be treated as one mentally diseased.

Klicpera, Václav Kliment (klich'perä), a Czech poet and novelist; born in Chlumec, Bohemia, in 1792. He wrote in a style that was picturesque, but occasionally somewhat coarse. Of a large number of dramas, the tragedy "Sobeslav"; and the comedies "The Magic Hat," "Ziska's Sword," "The Liar," "The Comedy on the Bridge," were successful. Among his novels may be named "Tocnik" and "Vilkovic." He wrote also patriotic verse, etc. ("Works," 1864.) He died in Prague in 1859.

Klingemann, Ernst August Friedrich (kling'e-män), a German dramatist; born in Brunswick, Aug. 31, 1777. His model was Schiller, and so successful in their day were his dramas that for years his name and Schiller's were coupled in popular speech. Among his works were: "Martin Luther"; "Cromwell"; "German Faith"; "Faust." When belonging to the management of the Brunswick Court Theater, he was the first to produce, though sorely against his will, Goethe's "Faust" (1829). He died in Brunswick, Germany, Jan. 25, 1831.

Klinger, Friedrich Maximilian von (kling'er), a German poet and novelist; born in Frankfort-on-the-Main, Feb. 17, 1752. Among his earlier dramas, including "The Twins" (1776), "Otta" (1781), "The Suffering Wife," etc., was "Sturm und Drang" (Storm and Stress: 1776), which gave its celebrated name to that period of German literature. He was called at the time he wrote it a "Shakespeare gone mad," and he himself referred in later life to his early productions as "explosions of youthful brains and ill humor." From them his evolution was toward moderation and restraint. Of his novels, best known was the gloomy "Faust's Life, Deeds, and Journey to Hell" (1791); unless indeed

"The Worldling and the Poet" (1798), consisting of psychological dialogues on the contrast between the actual and the ideal world, were its successful competitor. "Reflections and Thoughts on Various Subjects of the World and Literature" (3 vols. 1802–1805) may also be mentioned. Early left an orphan in wretched circumstances, after various vicissitudes he entered the service of Russia, where he rose to high position. He died in Dorpat, Feb. 25, 1831.

Klipspringer, a species of antelope, about equal in size to the chamois, and resembling it in habits, found in the highest mountainous districts of South Africa. It is of a yellowish-gray color, and the hair is long, and stands out from the skin so as to make a rough fur. The legs and the general form are more robust than in most species of antelope. The flesh of the klipspringer is particularly esteemed; the hair is also valued for stuffing saddles; and it has therefore become rare in localities where it was once common. The pinnacles and precipices in which it delights make hunting it with dogs impossible, but to get within rifle shot of it is not difficult.

Klondike, The, a river which enters the Yukon, the principal river of the Northwest Territory, Canada, 45 miles below the mouth of Sixty Mile creek, 15 miles above old Fort Reliance. The word is now applied to the region surrounding the Klondike river and its tributaries, and which lies in the Yukon district of the Territory, about midway of and just across the boundary line between Alaska and the British possessions.

As early as 1862 gold was discovered in Alaska, but no especial notice was taken of it; 13 years later gold was found at the head of the Stikine river, in the S. E. part, about 300 miles N. of Fort Wrangel, and a rush was made to the fields. Fort Wrangel became a prosperous town but as soon as the rich placer diggings were exhausted, men became discouraged, owing to the lack of stamp mills and the expense of working the quartz, and the mines were finally abandoned. In 1880, Juneau, a Frenchman, with a companion started out from Sitka and traveling N. discovered gold in a creek which they named Gold creek, and at the mouth of this creek founded a town first called Harrisburg and later Juneau and which soon became the center of mining supplies and a considerable fur trade. In 1886 a rich find was reported on Stewart river, in the Yukon district, and the following year an expedition was sent out by the Canadian government, headed by George M. Dawson, which explored the Upper Yukon and reported the existence of an abundance of gold. The difficulties and hardships to be encountered in reaching the location were so great that but a few hundred miners attempted to seek their fortunes there. These, however, persevered and established Circle City on the Alaska side of the boundary and by 1892 were taking out an annual total of about $300,000. It was not till 1897 that the wonderful riches of the Klondike region were made known through George McCormick, or Cormack, who went from Illinois to Alaska in 1890 and there married an Indian squaw. In 1897 he located at the mouth of the Klondike river for the purpose of salmon fishing, but this not proving profitable that season he in company with some Indians moved up the river till they came to Bonanza creek which they began to explore for gold. They found large quantities of paying dust and located an extensive claim. Going to the Indian village from which they came for supplies, the news of their find quickly spread, other claims were forsaken, some of the prosperous towns were deserted and miners from every direction poured into the newly found gold fields. Joseph Ladue, an old prospector and well-known miner, was one of the first to explore the country and his statements gave an impetus to the steadily increasing stream of gold hunters. Clarence Berry, a miner, returned to Juneau in the fall of 1897 on his way home to San Francisco with $130,000 in dust which had been thawed and sluiced out of 30 box lengths of soil in a few weeks' time. And this is but one of many similar experiences, which aroused the wildest excitement all over the United States, with which the Californian "gold fever" of 1849 stands no comparison. All through the fall and winter of 1897 the mad rush for the Klondike region continued. The almost unknown towns of Juneau, Dyea and Skaguay, sprang into sudden prominence and rapidly added to their population, while Dawson City in which the first hut was built in September, 1896, six months later had 500 houses, and in 1901 had grown to a prosperous city with handsome residences, hotels, banks, schools, churches and many modern improvements.

This section of country is not far removed from the Arctic regions. For seven months of the year intense cold prevails, varied by furious snow storms which begin in September and occur at intervals till May. By Oct 20, ice is formed over all the rivers. The ground for the better part of the year is frozen to the depth of from 3 to 10 feet and the only way to get at the gold is to thaw the earth by building a fire and afterward break up the soil with a pick. When the warmer weather comes this is washed in running water which carries away the dirt and pebbles, leaving the gold at the bottom of the pan or sieve. Many nuggets of fine gold have been found varying in

value from a few dollars up to a hundred. The amount of gold dust and nuggets taken out of the Klondike region within two months after the discovery was $5,000,000 and in 1898-1910 it reached $150,000,000, and experts estimated an equal amount yet to be mined. See ALASKA.

Klopp, Onno (klōp), a German historian; born in Leer in 1822. For a number of years he was a teacher in the gymnasium at Osnabrück, and later became a close friend of George V. of Hanover. A strong anti-Prussian tendency is the only blemish in a series of remarkable historical productions, such as a "History of East Friesland" (1854–1858); "King Frederick of Prussia and the German Nation" (2d ed. 1867); "Tilly in the Thirty Years' War" (1861); "The Fall of the House of Stuart" (14 vols. 1875–1887); "The Thirty Years' War to the Death of Gustavus Adolphus" (1891). He died Aug. 9, 1903.

Klopsch, Louis, an American publisher; born in Germany, March 26, 1852. As owner of the "Christian Herald" he was prominent in many philanthropic movements. In 1898 he led the efforts to relieve the Cuban reconcentradoes and in 1900 was at the head of the India famine relief cause. He died March 7, 1910.

Klopstock, Friedrich Gottlieb (klop'-stok,), a German poet; born in Quedlinburg, July 2, 1724. In freeing German poetry from the exclusive reign of the Alexandrine verse, he was the founder of a new era in German literature. His great epic "Messian" (1748–1773), at first partly written in prose and changed afterward to hexameters, made him famous; its effect on German thought was great, and its influence can be traced down succeeding German literature. His most finished work, however, was doubtless his "Odes," which represent intellectual originality and truth. Even Schiller and Goethe were artistically indebted to him. He died in Hamburg, March 14, 1803.

Knapp, Albert (knäp), a German religious poet; born in Tübingen, July 25, 1798. Many of his hymns can be found in the manual "Christoterpe" (1833–1853), a collection which had previously appeared in small volumes, one issued each year. His "Evangelical Treasury of Songs for Church and Home" (1837) was taken from the liturgies and hymns of all Christian countries. He gave great impetus to the poetry of devotion in Germany. He died in Stuttgart, June 18, 1864.

Knapp, Samuel Lorenzo, an American author; born in Newburyport, Mass., Jan. 19, 1783; was graduated at Dartmouth College in 1804; became a lawyer; and during the War of 1812 was commander on the coast defenses. He was editor of the Boston "Gazette," the "Boston Monthly Magazine" and "The Library of American History"; and in 1826 established the "National Republican," which failed; and was the author of "Biographical Sketches of Eminent Lawyers, Statesmen, and Men of Letters" (1821); "The Genius of Freemasonry" (1828); "History of the United States" (1834); "Life of Aaron Burr" (1835); etc. He died in Hopkinton, Mass., July 8, 1838.

Knapsack, a soldier's or tourist's case or wrapper for clothes, etc., to be carried on the back during a march; a tourist's or traveler's satchel.

Knapweed, a popular name given to some species of *Centaurea*. *C. Nigra,* black knapweed; and *C. scabiosa,* greater knapweed, are common weeds, being rough, hardy herbaceous plants growing by waysides, etc.

Knaus, Ludwig (knous), a German painter; born in Wiesbaden, Oct. 10, 1829. He studied at Düsseldorf under Karl Sohn and Schadow, but struck out a path for himself, painting subjects from everyday rustic life. In 1852–1860 he lived mostly in Paris and painted the chief pictures of his first period, "The Golden Wedding," "The Baptism," and "The Setting-out for the Dance." In 1861–1866 he resided in Berlin, among his paintings of this period being "The Juggler," "His Highness on His Travels," "Cobbler Boy" and "Organ-grinder." From 1866 to 1874 he lived in Düsseldorf, and to this period belong some of the pictures on which his fame as a genre painter is most securely founded: "The Children's Feast," "The Funeral," "The Goose-girl," Brothers and Sisters," etc. Among his later pictures are "A Holy Family," "Bad Roads" (a tavern scene), "The Stubborn Model," "The Wisdom of Solomon," "Behind the Scenes," etc. He also painted portraits.

Knee, the articulation between the femur or thigh bone, above, and the tibia or shin bone, below. A third bone, the patella, or knee cap, also enters into the structure of this joint anteriorly. The articular surfaces of these bones are covered with cartilage, and connected together by ligaments, some of which invest the joint and lie external to it, while others occupy its interior. The synovial membrane is the largest in the body. It lines the investing ligament, and is prolonged on the front of the femur above the articular surface, covers certain of the ligaments in the interior of the joint, and forms folds on a large cushion of fat placed between the tibia and patella.

The most important of the external ligaments are the anterior or *ligamentum patellæ*, which is in reality that portion of the *quadriceps extensor cruris* which is continued from the knee cap to the tubercle of

the tibia; one internal and two external lateral ligaments; a posterior ligament; and a capsular ligament, which surrounds the joint in the intervals left by the preceding ligaments. The positions of these ligaments are sufficiently indicated by their names. Of the internal ligaments the two crucial, so called because they cross one another, are the most important. The external and internal semilunar cartilages are usually placed among the internal ligaments; they are two crescentic plates of fibro-cartilage. The convex border of each cartilage is thick; the concave free border is thin. Each cartilage covers nearly the marginal two-thirds of the corresponding articular surface of the tibia, and by its form deepens these surfaces for firmer articulation with the condyles of the femur.

The chief movements of this joint are those of a hinge-joint — namely, flexion and extension; but it is also capable of slight rotatory motion when the knee is half-flexed. During flexion the articular surfaces of the tibia glide backward on the condyles of the femur; while in extension they glide forward. The whole range of motion of this joint, from extreme flexion to extreme extension, is about 135°. Judging from its articular surfaces, which have comparatively little adaptation for each other, it might be inferred that this was a weak and insecure joint; and yet it is very rarely dislocated. Its real strength depends on the large size of the articular ends of the bones, on the number and strength of the ligaments, and on the powerful muscles and fasciæ by which it is invested.

Knee Cap, or **Patella,** a sesamoid bone, developed in the single tendon of the *rectus, crureus, vastus externus,* and *vastus internus* muscles — the great quadriceps extensor muscle of the leg. It is heart-shaped in form, the broad end being directed upward, and the apex downward. The anterior or external surface is convex, perforated by small apertures for the entrance of vessels, and marked by rough longitudinal striæ; the posterior or internal surface is smooth and divided into two facets by a vertical ridge, which corresponds and fits into the groove on the lower articulating surface of the femur or thigh-bone, while the two facets (of which the outer is the broader and deeper) correspond to the articular surface of the two condyles.

This bone is liable both to dislocation and fracture. Dislocation may occur either inward or outward; but it is most frequent in the outward direction. The displacement may be caused either by mechanical violence, or by too sudden contraction of the extensor muscles in whose conjoined tendon it lies; and is most liable to occur in knock-kneed, flabby persons. Except in one rare variety, the dislocation is capable of being reduced without any difficulty. Fracture of the patella may, like dislocation, be caused either by muscular action or by mechanical violence.

Fracture by violent muscular action, as when a person in danger of falling forward attempts to recover himself by throwing the body backward, is the more common of the two forms. The treatment consists in relaxing the opposing muscles by raising the trunk, and slightly elevating the limb, which should be kept in a straight position. In consequence of the great difficulty of bringing the broken surfaces into exact apposition it is very difficult to obtain bony reunion of the parts, and the case generally results either in mere ligamentous union or in no true union at all.

Kneeland, Samuel, an American naturalist; born in Boston, Mass., Aug. 1, 1821. In 1866 he became Professor of Zoölogy and Physiology in the Massachusetts Institute of Technology. He was a member of numerous scientific societies, and contributed many articles to medical literature. In addition to editing "The Annual of Scientific Discovery" (1886–1889), a translation of "Andry's Diseases of the Heart" (1847), and Smith's "History of the Human Species," he wrote "Science and Mechanism" (1854); "The Wonders of the Yosemite Valley and of California" (1871); and "An American in Iceland" (1876). Died in 1886.

Kneeling, probably the general posture of the early Christians in prayer not regulated by public authority, but the early Church made no distinction in language between kneeling and prostration. At communion the first prayer was said kneeling, the rest of the liturgy standing. At other times of service the rule was for all to kneel in prayer except on Sundays and between Easter and Whitsuntide.

Kneipp, Sebastian, a German clergyman; born in Stefansried, May 17, 1821. He became a Roman Catholic priest in 1852. His attention was early drawn to the "water cure" which he advocated for years. This method was chiefly walking barefoot in dew-moistened grass. He died in Worishafen, June 17, 1897.

Kneller, Sir Godfrey, an English portrait painter; born in Lübeck, Aug. 8, 1648. He learned painting under Rembrandt and Ferdinand Bol. While studying further in Italy he chose historical subjects, but afterward gave himself entirely to portrait painting. In 1674 he went to London, and, on the death of Sir Peter Lely in 1680, was appointed court-painter to Charles II. This office he retained during the reign of James II. and continued to fill it after the Revolution. In 1692 William III. knighted him,

and in 1715 George I. made him a baronet. Kneller's best-known productions are the "Beauties of Hampton Court" (painted by order of William III.), his portraits of the "Kit-Cat Club," and of nine sovereigns (Charles II. to George I. of England, Louis XIV., Peter the Great, and the Emperor Charles VI.). He painted avowedly for the love of money, and hence never did justice to the undoubted talent he possessed. His reputation was due to his rapid brush and his quick eye for likeness, and to the fact that there was nobody to dispute supremacy with him. He died in Twickenham, Nov. 7, 1723.

Kneph (nef), the ram-headed god of ancient Egypt, called also Amen-ra, and by the Greeks, Ammon.

Knickerbocker, Herman Jansen, of Friesland, Holland; one of the earliest settlers of New York. A descendant, Johannes (1749–1827), was an intimate friend of Washington Irving, who immortalized the name by his "History of New York" by "Diedrich Knickerbocker" (1809). It has since been used as a generic term for New York families descended from the original Dutch settlers.

Knigge, Adolf Franz Heinrich von, Baron (knig'uh), a German writer; born in Bredenbeck, near Hanover, Oct. 16, 1752. The most important of his works, "On Converse with Men" (2 vols. 1788), gave maxims and rules for the conduct of life, of which it showed profound knowledge. "The Journey to Brunswick" (1839, illustrated) was a humorous novel, and has frequently been reprinted. "The Romance of My Life" (1781) has been a great favorite. He was one of the "Illuminati"; and published a defense of Illuminism in his adept's name "Philo." He died in Bremen, May 6, 1796.

Knight, a man admitted to a certain degree of military rank, with certain ceremonies or religious rites, the candidate for knighthood being called upon to prepare himself by fasting and prayers, watching his arms alone all night in a chapel, and by receiving the accolade. Also one who holds a certain dignity conferred by the sovereign or his representative, and entitling the possessor to the title of Sir prefixed to his name. The dignity differs from that of a baronet in not being hereditary. Wives of knights are legally entitled to the designation of Dame, but are more commonly addressed as Lady.

Knight, Charles, an English writer and publisher; born in Windsor, England, March 19, 1791. His life was one of wide activity and increasingly great usefulness to his country from the time when he became publisher of "The Etonian" for Praed, Macaulay, Nelson, Coleridge, etc., while they were students at Eton. He was editor of "Knight's Quarterly Magazine"; superintendent of publications to the famous Society for the Diffusion of Useful Knowledge; publisher of the "Library of Entertaining Knowledge," in which he wrote several volumes; publisher of the "Penny Magazine" (1832) and of the "Penny Cyclopædia" (1833). His great work was the "Popular History of England" (8 vols. 1854–1861), a monument of research, breadth of view, and devotion to the people. His autobiography, "Passages from a Working Life" (3 vols. 1864–1865), is one of the most interesting of books. His "Pictorial Shakespeare" (8 vols. 1839–1841), which he himself probably considered the work of his life, served a good end; and "The Shadows of the Old Booksellers" (1865) is a gem of its kind. He wrote also a historical novel entitled "Begg'd at Court" (1868). He died in Addlestone, Surrey, England, May 9, 1873.

Knight, Edward Frederick, an English journalist; born April 23, 1852. He was graduated at Cambridge and in 1891 became correspondent of the London "Times," distinguishing himself in the Sudan campaign in 1896 and in Greece in 1897. He wrote "Albania and Montenegro"; "The Cruise of the Falcon"; "The Threatening Eye"; "Sailing" (All England Series of Sports); "The Falcon on the Baltic"; "The Cruise of the Alerte"; "Save Me from My Friends"; "Where Three Empires Meet"; "Madagascar in War Time"; "Rhodesia of Today," etc.

Knight, Jonathan, an American physician; born in Norwalk, Conn., Sept. 4, 1789. He was graduated at Yale College in 1808; studied at the medical school of the University of Pennsylvania 1811–1813; became Professor of Anatomy and Physiology at Yale in 1813, and in 1838 was transferred to the chair of surgery; was president of the American Medical Association in 1853. He obtained in 1862 the establishment of a United States military hospital at New Haven. He died in New Haven, Conn., Aug. 25, 1864.

Knight, William Angus, a Scotch writer; born in Mordington, Berwickshire, Feb. 22, 1836. He was Professor of Philosophy at the University of St. Andrews after 1876, and made valuable additions to philosophical and general literature. Among his numerous publications are: "Poems from the Dawn of English Literature to the Year 1699" (1863); "Colloquia Peripatetica" (1870); "Studies in Philosophy and Literature" (1879); "Memorials of Colenton" (1887); "Wordsworth's Prose" (1893); "Aspects of Theism" (1894). He has also been the editor of "Philosophical Classics for English Readers" (15 vols. 1880–1890), and "University Extension Manuals" (18 vols. 1891–1894).

Knighthood, Order of, a duly organized and constituted order or body of knights. They are of two kinds, the first consisting of associations or fraternities, possessing property and rights of their own, as independent bodies; the second honorary associations established by sovereigns within their own dominions. To the first class belong the Knights Templars and Hospitallers; to the second those numerous orders established in different countries, as the Order of the Holy Ghost, the Order of the Golden Fleece, etc., in European countries, and the Orders of the Bath, the Garter, St. Patrick, St. Michael, and St. George, the Thistle, etc., in Great Britain. Each order has its appropriate insignia, generally including ribbon, collar, badge, or jewel and a star.

Knight of the Shire, the designation given to the representatives in Parliament of English counties at large, as distinguished from such cities and towns as are counties of themselves (which are seldom, if ever, called shires); and the representatives of which, as well as the members for other cities and towns, are called citizens or burgesses.

Knights and Ladies of Honor, a fraternal beneficiary society founded in the United States in 1877. In 1909 it reported a membership of 91,000; benefits disbursed since organization, $28,000,000.

Knights Hospitallers. See HOSPITALLERS.

Knights of Faith and Charity, a monastic order established in France in the 13th century to suppress public robberies. It obtained the sanction of Pope Gregory IX.

Knights of Honor, a fraternal benevolent society founded in the United States in 1873. Membership reported in 1909 at 21,600; benefits disbursed since organization, $94,945,399.

Knights of Labor, a national labor organization in the United States and Canada, founded in Philadelphia in 1869. It is to be distinguished from trades-unions as embracing all classes and kinds of labor, and extending, through its local assemblies, over the whole country. The professed objects of the body are just and reasonable, and such as appeal strongly to public sympathy. The first general assembly was held in 1878; from this year the numbers rapidly increased, and the oaths of secrecy formerly administered were abolished soon after. In 1883 there were 53,000 members, in 1886 there were 730,000; in 1886 and 1887, however, the system of "boycotting" having been introduced, the business of the country was greatly disturbed, and since then the strength of the organization has declined. At the convention of 1888 the total

was admitted to have fallen below 500,000; and dissensions and litigation amongst its officers have since further weakened the body till in 1902 its claimed membership aggregated only 200,000. Renewed interest is now being taken by its members on the promise of many of its former leaders again to take up the work of the organization. It is confidently expected that the Order will soon have recovered thousands of its former members and much of the prestige it has lost during the past few years.

THOS. H. CANNING.

Knights of Pythias, a secret fraternal order organized at Washington, D. C., in 1864, and numbering in the United States in 1909 over 703,000 members, with an endowment rank of over 71,450 members, carrying an endowment of over $110,011,500.

Knights of the Maccabees, a benevolent association, founded in 1881, and numbering in the United States in 1903 over 350,400.

Knights of the Round Table. See ROUND TABLE, KNIGHTS OF THE.

Knight Service, the most honorable species of feudal tenure. See FEUDAL SYSTEM.

Knights Templar, a degree or order of modern Freemasonry ranking in dignity above the Blue Lodge and the Royal Arch Chapter. The orders conferred in a commandery of Knights Templar are Red Cross, Knight Templar, and Knight of Malta. A Mason to obtain these orders must be a Master Mason and Royal Arch Mason in good standing. The number of grand commanderies in the United States and Territories in 1909, each representing individual States and Territories (except that Massachusetts and Rhode Island are combined), was 46. The number of commanderies under the jurisdiction of the Grand Encampment was 1,201; membership, 171,149. These were exclusive of subordinate commanderies in Delaware, Idaho, Nevada, New Mexico, Sandwich Islands, South Carolina, and Utah, with a membership of 2,200. Total membership, 173,349.

Knipperdolings, a fanatical sect of German Anabaptists of the 16th century. They derived their name from their founder, Bernard Knipperdoling.

Knitting. The art of knitting is modern; it cannot be traced back farther than about 1500, and is believed to have originated in Scotland shortly previous to that date. It consists in the construction of a looped fabric in which for the first row a succession of loops are cast on or preferably knitted on to a needle, and in succeeding rows each loop is passed through the loop of each succeeding row. It differs distinctly from braiding, netting and weaving, which is, as here mentioned, perhaps the

order of invention, knitting being centuries later than either of the others.

Knitting Burr, a wheel having wings arranged radially and diagonally across its face, and adapted to operate upon the yarn and fabric. There are several kinds, as follows: A loop wheel, the wings of which are notched, and take the yarn delivered by the guide, and push it up under the hooks or beards of the needles; a sinker wheel, which presses the yarn into loops between the needles, to insure that there shall be enough to form the proper-sized stitch in the fabric; a landing wheel, which raises the loops of the fabric a short distance above the points of the needle beards while they are closed by the presser; and a stripping or knocking over wheel, which throws the loops of the fabric entirely over the tops of the needles to complete the stitch.

Knitting Cup, a cup of wine handed round after a couple had been knit together in matrimony; also called the contracting cup.

Knitting Machine, an apparatus for mechanically knitting jerseys, stockings, and other knitted goods. There are many kinds of machines, one of the best known, which is on what is known as the circular system, being described as follows: A bed plate having a vertically projecting and grooved needle guiding cylinder or bed is secured to a table or other suitable support. On the bed plate is a loose ring, provided with a thread guide for conducting the thread to the needles, and about the needle cylinder is a revolving cylinder, having an annular groove interrupted by a cam portion, and provided with adjustable cams, which govern the downward motion of the needles, and consequently the length of the loops, and raise the needles; and two of these latter cams are needed to provide for reversing the machine for knitting the heel or a flat web. The cam cylinder is moved by a bevel gear connected to a driving crank, and when moved continuously in one direction knits a circular web; and this web may be narrowed as desired, to fashion the leg, by removing needles, and placing their loops on adjacent needles. One needle receives the thread within its hook, and is subsequently moved by the cam cylinder so as to form the thread so taken into a loop. When the heel is to be formed, a portion of the needles are drawn up, thus retaining their loops, and the number of needles left in action correspond with the width of the heel to be formed. The cam cylinder is now to be reciprocated in opposite directions, and in order to keep the thread-guide in advance of the descending needles sufficiently far, so that the thread will be caught, pins are inserted in the bed plate, and engage the heel of the thread carrier, and stop it just before the cam cylinder is stopped.

Knorring, Sofia Margarete von (knor'-ing), a Swedish novelist; born Sept. 29, 1797. Unlike Fredrika Bremer, who described middle-class life, she was the novelist of Swedish society; seeing its follies and frivolities indeed, but lacking that power of satire which makes, for instance, Thackeray's handling of similar material so effective. Vivid and graceful, she wanted simplicity and out-spokenness. Her best works were: "Kusinerna"; "Axel"; "Class Parallels"; "A Peasant and his Surroundings," the only novel in which she treats of middle or lower class life. She died Feb. 13, 1848.

Knort, a name given in Lapland to a species of sandfly which is a greater pest there than is even the mosquito. It quietly works its way into a person's clothing, where it makes itself as much at home as any of the wingless vermin. Its bite is practically painless, and hardly noticeable at the time, but on the second day it swells into a big, burning wound, to rub or chafe which is intolerable agony.

Knortz, Karl (knorts), a German-American miscellaneous writer; born in Garbenheim, near Wetzlar, Aug. 28, 1841. In 1863 he came to the United States, and in 1892 became superintendent of the German department of the Evansville, Ind., public schools. Notable among his works are: "Tales and Legends of the North-American Indians" (1871); "American Sketches" (1876); "Longfellow" (1879); "From the Wigwam" (1880); "Indian Legends"; "Pictures of American Life" (1884). With Dickmann (1880) he collaborated on "Modern American Lyrics."

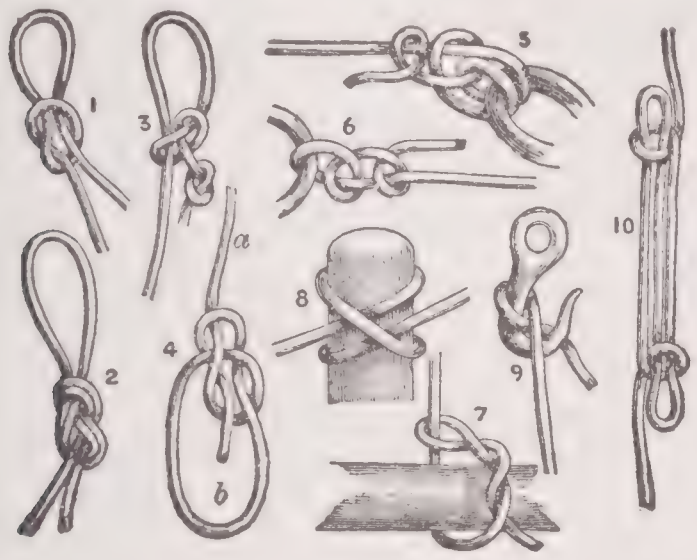
Knot, a nautical synonym for the geographical mile. The geographical mile is one-sixtieth of a mean degree of a meridian on the earth, and is therefore one-sixtieth of 69.09 English statute miles, or, what is the same thing, the length of the geographical mile, or knot, or nautical mile (as it is also called) is 6,080 feet. Hence when a ship has gone 1 knot it has gone 1.1515 statute miles, or, what is nearly the same thing, a ship which is running 13 knots an hour is traveling at the same speed as a railway train which is going 15 miles an hour. The name is derived from the knots tied on a ship's log line.

Knot, a wading bird, which has the breast deep chestnut in summer and white in winter, and the back dark with fulvous spots in summer and ashy-gray in winter. It breeds within the Arctic circle, from which it migrates in autumn to the Eastern Hemisphere, as far even as the Cape and Australia.

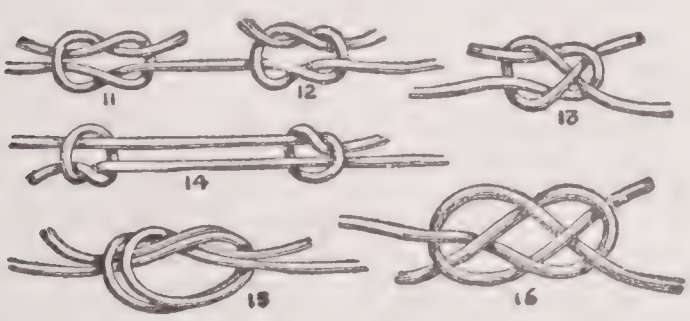
Knot Grass, a prostrate plant, with internodes, narrow leaves, silvery stipules,

and white, pink, crimson, or green inconspicuous flowers, clustered in the axils of various leaves. It is common in fields and waste places. An infusion of this plant was formerly supposed to have the power of stopping the growth of any animal, whence Shakespeare, "Midsummer Night's Dream," iii: 2, calls it "hindering" knot grass. Allusions to this fancied power may also be found in the works of his contemporaries.

Knots and Splices include all the various methods of tying, fastening, and joining ropes or cords. From 150 to 200 different



kinds of knots may be enumerated, mostly used on shipboard, though almost all occupations using ropes or cordage have special kinds of knots adapted to their different requirements. While the great majority of these are purely technical, there are a few so generally useful in the everyday occurrences of life that they may be shortly described. The figures represent the various knots before they are drawn taut, the better to show the method of tying. Generally, the requirements of a useful knot may be stated to be that it should neither "slip" nor "jam"—*i. e.*, that, while it holds without danger of slipping while the strain is on it, when slackened it should be easily untied again. The simplest knot is the common one tied on the end of a thread

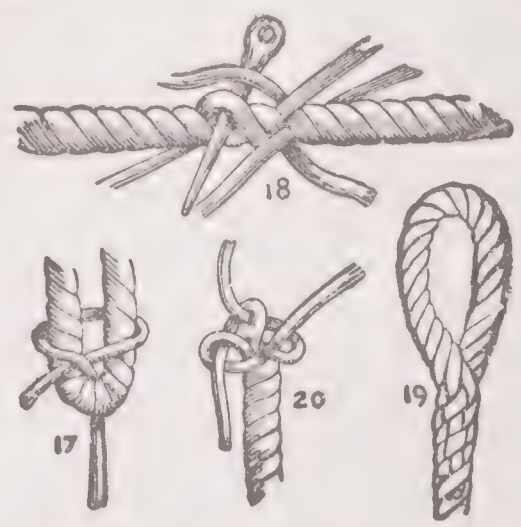


or cord to prevent it slipping. By passing a loop instead of the end of the cord the common slip knot (fig. 1) is formed; and a useful fixed loop is got by tying a simple knot, or the "figure of 8 knot" (2), on the loop of a cord. One of the simplest and most useful running knots for a small cord is made by means of two simple knots (3).

The most secure method of fastening a line to, say, a bucket is the standing bowline (4); and a running bowline is formed by passing the end *a* through the loop *b*, thus making a running loop. Another good knot to make fast a bucket is the anchor bend (5). Out of the score or so of methods of fastening a boat's painter the one which will be found most useful is the well-known two half-hitches (6). The timber hitch (7) is useful for attaching a line to a spar or a stone, and the clove hitch (8) is invaluable for many purposes. It is very simple and cannot slip.

A simple method of fastening a rope to a hook is the blackwall hitch (9), where the strain on the main rope jams the end so tightly against the hook that it cannot slip. There are many methods for shortening a rope temporarily, one of them being the sheepshank, the simplest form of which is shown in fig. 10.

Of the methods for uniting the ends of two cords the simplest and one of the most secure is the common reef knot (11), which must be carefully distinguished from the "granny" (12), which will jam if it does not slip; the reef knot will do neither. For very small cords or thread the best knot is the weaver's (13). The fisherman's knot is a very useful one for anglers, and is



formed by a simple knot in each cord being slipped over the other (14); when drawn taut it is very secure, and it is easily separated by pulling the short ends. A useful method of uniting large ropes is shown in figure 15: tie a simple knot on the end of one rope and interlace the end of the other, and draw taut. This tie may also be made with the figure of 8 knot. For very large ropes the carrick bend (16) is the simplest and most secure. The bowline bend is formed by looping two bowline knots into each other. For attaching a small line to a thick rope the becket hitch (17) is very useful.

"Splicing" is the process employed to join two ropes when it is not advisable to use a knot. The three chief varieties of the splice are the short splice, the long splice, and the eye splice. The short splice is made by unlaying the ends of two ropes for a

short distance and fitting them closely together; then, by the help of a marlinspike, the ends are laced over and under the strands of the opposite rope, as shown in figure 18. When each strand has been passed through once, half of it is cut away and the remainder passed through again; half of the remainder being also cut away, it is passed a third time, and, when all the strands are so treated, they are hauled taut and cut close. This reducing the thickness of the strands tapers off the splice. The long splice is employed when the rope is used to run through a block, as it does not thicken it. The ends of the two ropes are unlaid for a much longer distance than for the short splice, and similarly placed together. Then one strand is taken and further unwound for a considerable distance, and its vacant place filled up with the corresponding strand of the other rope, and the ends fastened as in the short splice. Other two of the strands are similarly spliced in the opposite direction, and the remaining two fastened at the original joining place. The eye splice is, as the term implies, used to form an eye, or round a dead eye, and is shown finished in figure 19.

To prevent a rope fraying at the ends a variety of methods are employed, the simplest being to serve or whip the end with small cord. Other methods are by interlacing the ends, one of which, the single wall, is shown at figure 20, the ends afterward being drawn taut and cut short.

Knout, an instrument of punishment formerly much used in Russia. It consists of a handle about two feet long, to which is fastened a flat leather thong about twice the length of the handle, terminating with a large copper or brass ring; to this ring is affixed a strip of hide about two inches broad at the ring, and terminating at the end of two feet, in a point. This is soaked in milk and dried in the sun to make it harder, and should it fall, in striking the culprit, on the edge, it would cut like a penknife. The culprit is bound erect to two stakes to receive the specified number of lashes, and the tail of the knout is changed at every sixth stroke.

Knowledge, a certain or clear perception of truth or fact; indubitable apprehension; cognizance. Knowledge is a general term which simply implies the thing known. Science, learning, and erudition are modes of knowledge qualified by some collateral idea. Science is a systematic species of knowledge which consists of rule and order; learning is that species of knowledge which one derives from schools, or through the medium of personal instruction; erudition is scholastic knowledge obtained by profound research.

Knowles, Herbert, an English poet; born in Gomersal, near Leeds, 1798. His reputation rests wholly on the poem "The Three Tabernacles," known otherwise as "Stanzas in Richmond Churchyard," written Oct. 7, 1816, when he was only 18 years old. It is a remarkable if not unique production, since, while being so precocious, it is mature in thought and feeling, and apart from one or two blemishes, perfect in form. Its solemnity and pathos have seldom been equaled. He died in Gomersal, Feb. 17, 1817.

Knowles, James Sheridan, an Irish actor and dramatist; born in Cork, Ireland, May 21, 1784. He made his first appearance as an actor in 1806, but never attained much eminence in that profession. Subsequently he taught elocution for several years at Belfast and Glasgow, and wrote for the stage. He abandoned dramatic work in 1845 from religious scruples, devoted himself to literature, and later became well known as a Baptist preacher. Of his works only the tragedy of "Virginius," produced 1820, and the comedies, "The Hunchback" (1832) and "The Love Chase" (1837), have survived. They are good "acting plays," and always popular, but possess little literary value. Among his other dramas may be mentioned: "Caius Gracchus" (1815); "William Tell" (1825); "Alfred the Great" (1831); "The Wife: A Tale of Mantua" (1833); "The Rose of Aragon" (1842). He died in Torquay, England, Nov. 30, 1862.

Knowltonia, a genus of South African plants, of the order *Ranunculaccæ*. *K. vesicatoria* is remarkable for its acridity and blistering power. The bruised leaves are used at the Cape of Good Hope instead of cantharides.

Knownothing, a member of a secret political association in the United States, organized for the purpose of obtaining the repeal of the naturalization law, and of the law which permitted others than native Americans to hold office. It started in 1853 and lasted two or three years. The principles of the Knownothing party were embodied in the following propositions (at New York, 1855): (1) The Americans shall rule America. (2) The Union of these States. (3) No North, no South, no East, no West. (4) The United States of America — as they are — one and inseparable. (5) No sectarian interferences in our legislation or in the administration of American law. (6) Hostility to the assumption of the Pope, through the bishops, etc., in a republic sanctified by Protestant blood. (7) Thorough reform in the naturalization laws. (8) Free and liberal educational institutions for all sects and classes, with the Bible, God's holy word, as a universal text book. A society was formed in 1855 in opposition to the above, called Knowsomethings. Both bodies were

absorbed into the two parties, Democrats and Republicans, at the presidential election in 1856.

Knox, Mrs. Adeline (Trafton), an American novelist, daughter of Mark Trafton: born in Saccarappa, Me., Feb. 8, 1845. Her home is in St. Louis, Mo. She wrote: "Katharine Earle" (1874); "His Inheritance. (1878); "An American Girl Abroad", etc.

Knox, Henry, an American military officer: born in Boston, July 25, 1750. He was distinguished as an adept in military science, and at the battle of Bunker Hill rendered valuable service to General Ward in reconnoitering the enemy's movements. He attracted the attention of Washington, who recommended him for the command of an artillery regiment. He particularly distinguished himself in the repulse of Cornwallis at Assunpink in 1777; at Princeton, on which occasion he received from Congress the appointment of Brigadier-General of artillery; and at the battle of Monmouth. For his signal service at Yorktown he was made Major-General. In 1785 he was appointed by Congress Secretary of War. He was the valued friend of Washington and rendered him great assistance in disbanding the army and in managing Indian affairs. He resigned from the Cabinet in 1795, retiring to private life. He died in Thomaston, Me., Oct. 25, 1806.

Knox, John, a Scotch religious reformer; born in Giffordsgate, near Haddington, Scotland, in 1505. A pioneer of Puritanism; prisoner of war, for 19 months confined in the French galleys; friend of Calvin and Beza; a preacher of sermons that moved their hearers to demolish convents; with a price on his head, yet never faltering; arrested for treason, an armed "congregation" at his heels; burned in effigy, for years a dictator — he spent his life forwarding the Reformation in Scotland. His great work, distinguished in Scottish prose, was his "History of the Reformation of Religion within the Realm of Scotland" (1584). His famous "Letter to the Queen Dowager" appeared in 1556; the "First Trumpet Blast against the Monstrous Regiment of Women" — inveighing against women taking part in the government, and which offended Queen Elizabeth — in 1558. He died in Edinburgh, Nov. 24, 1572.

Knox, John Jay, an American financier; born in Knoxboro, N. Y., March 19, 1828. He was graduated at Hamilton College in 1849; was a banker till 1862, when he received an appointment from Secretary Chase, and subsequently had charge of the mint coinage correspondence of the Treasury Department; in 1867 he was appointed deputy comptroller of the currency. A bill which he proposed was passed with a few modifications, and is known as the Coinage Act of 1873. In 1872 he was appointed comptroller of the currency; resigned 1884, and became president of the National Bank of the Republic, New York. He died in New York city, Feb. 9, 1892.

Knox, Philander Chase, an American lawyer; born in Brownsville, Pa., May 4, 1853; was graduated at Mount Union College, Alliance, O., in 1872; settled in Pittsburg, Pa.; and was admitted to the bar there in 1875. He was appointed assistant United States district attorney for Western Pennsylvania; resigned after serving one year and engaged in the practice of his profession. On April 5, 1901, he was appointed Attorney-General of the United States, and, in March, 1909, United States Secretary of State. Mr. Knox was a member of a number of clubs in Pittsburg, New York, and Philadelphia; and in 1897 was elected president of the Pennsylvania Bar Association.

Knox, Thomas Wallace, an American traveler; born in Pembroke, N. H., June 26, 1835. He made a journey around the world as a newspaper correspondent in 1886. He wrote many popular books for the young. His published works include: "Underground Life" (1873); "How to Travel" (1880); "Lives of Blaine and Logan" (1884); "Decisive Battles since Waterloo" (1887); "In Wild Africa" (1895); etc. He died in New York city, in 1896.

Knox, William, a Scotch poet; born in Roxburgh in 1789. Except for the well-known poem beginning "Oh why should the spirit of mortal be proud?" which President Lincoln was fond of repeating in full, he is almost forgotten, though Sir Walter Scott and his contemporaries had considerable regard for his talents. "Mariamne" and "The Lonely Hearth" also enjoyed a good deal of popularity. He died in 1825.

Knox College, a coeducational non-sectarian institution in Galesburg, Ill.; founded in 1837; has endowment funds exceeding $525,000; grounds and buildings valued at over $250,000; scientific apparatus, etc., $30,000; volumes in the library, 10,000; average number of faculty, 30; average student attendance, 680; number of graduates, over 1,750.

Knoxville, a city and county-seat of Knox co., Tenn.; on the Tennessee river and the Atlanta, Knoxville, and Northern and other railroads; 111 miles N. E. of Chattanooga. It is at the head of steamboat navigation on the river; has a large trade in general commodities, and in logs and lumber particularly; is the center of important marble industries; and has sawmills, iron and nail works, car and rail-

road shops, and cotton and woolen mills. Among noteworthy institutions are the University of Tennessee, with an agricultural experiment station, Knoxville College for Colored Students (Unit. Pres.), East Tennessee Institute, Tennessee Medical College, Holbrook College, the Austin (for colored pupils), Girls, East, and West High Schools, the Southern, Knox County, and college libraries, the Eastern State Insane Asylum, State Institutions for White and Black Deaf Mutes, the Lawson McGhee Memorial, etc. The city was founded in 1792; State capital in 1796–1811; chartered as a city in 1816; and was enlarged by the incorporation of West Knoxville and North Knoxville in 1888 and 1889 respectively. In 1900 the city had a total assessed property valuation of $11,201.200. and had resources aggregating $485,480 Pop. (1900) 32,637; (1910) 36,346.

Knuckle Joint, a joint in which a projection on each leg or leaf of a machine or implement is inserted in corresponding recesses in the other, the two being connected by a pin or a pivot on which they mutually turn. The legs of dividers and the leaves of butt-hinges are examples of the true knuckle joint. The term, however, is somewhat commonly applied to joints in which the motion is not confined to one place.

Knur and Spell (called by Strutt "Northen Spell"), an old English game played with a ball, which is "risen" from a trap and hit with a bat made for the purpose. The ball, called the "knur," is made of wood, a little bigger than a walnut. The bat, called a "tripstick," as it is also used to spring the trap or "spell," consists of a piece of hard wood, 6 by 4 inches, and 1 inch thick (the pommel), attached to a supple handle from 3 to 4 feet long, which the player grasps with both hands, giving the full swing of his body with the stroke. The game consists of the cumulative distance of a given number of strokes, the player who has the greatest number of yards being the winner.

Knysna, a forest tract and elephant preserve, extending from the sea to the Outeniqua mountains in Cape Colony, 150 miles W. of Port Elizabeth.

Koala, the *Phascolarctos cinereus,* a marsupial mammal, allied to the kangaroo, etc.; is confined to the Australian province, where it is known as the native sloth, native boar, or native monkey. The body is about two feet long, the fur being of a slate-gray color, and the ears tufted with long hairs. The tail is quite abortive, but the want of this appendage — so useful when of prehensile kind to arboreal animals — is compensated for by the possession of strong curved claws, which assist the koala in its climbing movements. The feet are further fitted for grasping objects, and the disposition of the toes or digits assist in rendering the feet admirably adapted for climbing. Thus the great toes of the hind feet, as in most monkeys, can be opposed to the other digits, so that objects may be seized between them; and in the fore limb the thumb or pollex and fore or index finger can together be opposed to the other fingers. The koala feeds on the leaves and soft parts of trees, but appears occasionally to burrow in search of roots. The young, like those of most marsupials, are carried in the characteristic pouch, but when sufficiently grown they are carried on the shoulder of the mother.

Kobbe, Gustav, an American author; born in New York, March 4, 1857; was graduated at Columbia University in 1877 and at its Law School in 1879; and later engaged in newspaper and magazine work. He is author of "The Ring of the Nibelung" (1889); "Wagner's Life and Works" (1890); "My Rosary and Other Poems" (1896); "New York and Its Environs"; etc.

Kobbe, Theodor Christoph August von, a German poet and novelist; born in Glückstadt, June 8, 1798. He was a humorous and entertaining writer. Of his works we name: "The Student's Mortal Pilgrimage" (1820); "The Swedes in the Convent at Utersen" (1830), a romance; "Humorous Sketches and Pictures" (1831); "Recent Tales" (2 vols. 1833); "Humorous Reminiscences of my College Days" (2 vols. 1840); "Comicalities from Philistine Life" (2 vols. 1841). He died in Oldenburg, Feb. 22, 1845.

Kobbe, William A., an American military officer; born in New York city, May 10, 1840; was educated in New York city, and in Wiesbaden, Freiberg, and Claustal, Germany; and was graduated at the United States Artillery School in 1873. He served in the Civil War as a private in the 7th New York regiment and rose to the rank of captain; and in the American-Spanish War as major of the 3rd United States artillery to Brigadier-General, U. S. A. In January, 1900, he was given command of an expedition to the S. extremity of Luzon, and in March following was appointed military governor of the Province of Albay (Luzon), and Catanduanes Islands, and temporary governor of the islands of Samar and Leyti; and soon afterward opened the hemp ports to commerce. In 1901 he was promoted Brigadier-General, and in 1904, Major-General and retired.

Kobe, a port of Central Japan; on the W. shore of the Gulf of Ozaka, about 20 miles S. of that city. Pop. (1898) 215,780. The foreign settlement is finely laid

out, and the town is one of the most attractive and prosperous in Japan. It has been open to foreign trade since 1860. Kobe has direct communication with Great Britain, Germany, Canada, and Australia; is noted for the excellent quality of its meat; has foreign banks, wharves for ocean steamers, extensive shipbuilding yards, and a large paper mill.

Kobell, Franz von (kō'bel), a German scientist and poet; born in Munich, July 19, 1803. A mineralogist, he made important contributions to his science. His verse, which belongs to the best German dialect poetry, was marked by humor, freshness, and heartiness. The Upper Bavarian and Palatine dialect poems, "Schnadahüpfeln und Sprücheln"; "Palatine Tales"; (1863); "Schnadahüpfeln und Geschichteln" (1872); "Hansl o' Finsterwald," etc., were among his best. A devoted hunter, he was able to depict attractively the mountain life of the Bavarian Alps; "Wildanger: Sketches from the Chase and its History" (1859) pleased sportsmen especially. He died in Munich, Nov. 11, 1882.

Kobold, a spirit, differing from the specter in never having been a living human creature. It is the German correspondent of the English goblin, of which it is probably the origin. From it the metal cobalt derives its name. The kobold is said to be connected with a house or family, and always to appear in human shape. Among the superstitious peasantry, the kobold is believed to be inclined to mischief and teasing, but, on the whole, more desirous of doing good than evil to men, except when irritated. In the mines they are believed to appear, sometimes in the form of a blue flame, sometimes in that of a dwarfish child, and to point out rich veins. The miners, however, are afraid of disturbing the underground kobolds.

Koch, Robert (kō*h*), a German bacteriologist; born in Klausthal, in the Harz Mountains, Dec. 11, 1843. He studied medicine at Göttingen, receiving his doctor's degree in 1866 at the age of 23. In 1879 he had begun his investigations of the causes of consumption, and on March 24, 1882, he announced the discovery of the tubercle bacillus before the Physiological Society of Berlin. In 1883 he was made a privy-councilor and placed in charge of the German expedition sent to Egypt and India to investigate the causes of cholera. This journey resulted in the discovery of the comma bacillus, or cholera germ, in May, 1884. He was rewarded with a gift of $25 000 by the government, and imperial titles and honors were showered upon him. In 1885 he was appointed a professor in the University of Berlin, the new chair of hygiene being created for him, and director of the Hygienic Institute. He subsequently returned to the investigation of tubercular diseases, but years of patient research were required before he was able to announce to the world his remedy for consumption and its allied diseases. He even went to the length of asserting (in 1900) that he had discovered a method of extirpating both malaria and mosquitoes, and in 1901 he announced his conclusion that meat from tuberculous cattle may be eaten with impunity. He died May 27, 1910.

Kochanovski, Jan (ko*h*-ä-nof'skē), a Polish poet; born in Sycyna in 1530. He was the most important Polish poet of the 16th century; and has been called the Polish Pindar. He wrote epics, panegyrics, political satires, ethical discussions, and a drama, "The Dismissal of the Greek Ambassadors" (1578), which took high rank. His best poem was "Lamentations," written at the death of his daughter — whom he called the Slavonic Sappho, and to whom he hoped his genius would be transmitted — and breathing bereavement and prayer. He died in Lublin, Aug. 22, 1584.

Kochab, a star of the third magnitude in Ursa Minor, "The Little Bear," and which in the time of Ptolemy was the actual pole-star.

Kock, Charles Paul de (kōk), a French novelist and playwright; born in Passy, France, May 21, 1794. A remarkably prolific writer, his long series of novels, nearly all of which he worked over for the theater, became the fashion with a certain "emancipated" circle of readers on both sides of the ocean. They showed observation and knowledge of their subject, the Parisian lower class life of his time, and were emphatically realistic. Among the most popular were: "Georgette" (1820); "Gustave" (1821); "Monsieur Dupont" (1824); "Wife, Husband, and Lover" (1829); "The Man with Three Pairs of Trousers" (1840); "A Woman with Three Faces" (1859); "The Millionaire" (1887). He wrote also popular songs. He may be called a Balzac on a lower and narrower stage. He died in Paris, Aug. 29, 1871.

Kock, Paul Henri de, a French novelist and playwright, son of Charles Paul; born in Paris, France, April 25, 1819. He followed closely in his father's footsteps, producing numerous novels and plays, which however, never enjoyed the same popularity. Titles of some of his novels are: "The King of the Students and the Queen of the Grisettes" (1844); "Kisses Accursed" (1860); "Absinthe Drinkers" (1863); "The New Manon" (1864); "Mademoiselle Croquemitaine" (1871). He died in Limeil, April 14, 1892.

Kodak, a kind of photographic camera by which instantaneous negatives are taken. These cameras are in the form of a small box, having a lens and shutter in one side and a reflector on top by which the operator can focus the lens. When this is done a button is pressed and the "snap shot" is taken. Each kodak is provided with a continuous roll of films on which from 6 to 12 pictures can be taken, and when this is full it is removed and the negatives developed.

Koehler, Sylvester Rosa, an American prose-writer; born in Leipsic, Germany, Feb. 17, 1837; came to the United States in 1849; was the editor of the "American Art Review," and author of "Art Education and Art Patronage in the United States" and a history of color painting. He died Sept. 15, 1900.

Kohath, the son of Levi and father of the Kohathites, who was appointed to carry the ark and the sacred utensils of the tabernacle during the journeyings of the Israelites in the desert. (Ex. vi: 16–24; Num. iv: 4–15.)

Kohinoor. See BRILLIANTS: DIAMOND.

Kohl, Johann Georg (kōl), a German traveler and author; born in Bremen, April 28, 1808. He studied at Göttingen, Heidelberg, and Munich, and settled in Dresden in 1838. From this point he made excursions to every important district of Europe, and on his return from each expedition published his experience in a series of works. In 1854 he came to the United States, where he spent four years, and prepared a series of maps for the government. Returning to Germany he became city librarian at Bremen, and there died Oct. 28, 1878. His writings include works on Austria, Great Britain, the Rhine, the Alps, Russia, Denmark, the Netherlands, Istria, Dalmatia, and Montenegro (all between 1842 and 1851); also books of travel in Canada (1856) and the United States (New York, 1857); and histories of the discovery of America (1861; Eng. trans. 1862), of the N. E. coast of America ("Maine Historical Collections," Portland, 1869), and of Magellan Strait (1877).

Kohlrabi, the turnip-stemmed cabbage, a variety of cabbage having a turnip-like protuberance on the stem just above the ground, which is the most edible part of the plant.

Kohlrausch, Friedrich (kōl'roush), a German physicist; born in 1840. He was an authority on electricity and wrote a standard text book on the science.

Kohlsaat, Herman Henry, an American publisher. He was educated in the public schools of Chicago and Galena, Ill. He acquired a fortune in the bakery business and other enterprises. In 1891 he became part owner of the "Inter-Ocean" of Chicago, and in 1894 owner of the Chicago "Times-Herald," now "The Record-Herald."

Kohut, Alexander (kō'höt), a Jewish-American theologian; born in Félegyházza, Hungary, May 19, 1842. He was one of the greatest Orientalists and Semitic scholars of his age. He was a member of the Hungarian Parliament; founded the Jewish Theological Seminary in New York (1886), in which he was professor (1886–1894). His chief work was "Complete Dictionary of the Talmud" (9 vols. 1878–1892). In later years he devoted himself to Arabic-Hebrew literature as recently discovered in the MS. fragments from Yemen. A noble monument has been raised to him in "Semitic Studies in Memory of Rev. Dr. A. Kohut" (Berlin, 1897); it is composed of contributions by Max Müller, Canon Cheyne, C. A. Briggs, M. Steinschneider, M. Heimthal, etc. He died in New York, May 25, 1894.

Kokand. See FERGHANA.

Kokomo, city and county-seat of Howard co., Ind.; on the Wildcat river and at the intersection of several important railroad systems; 54 miles N. of Indianapolis. It is the farming trade center for a region within a radius of nearly 20 miles; is the principal city in the natural gas area of Indiana; and is principally engaged in agriculture, stock-raising, lumbering and manufacturing. It has a driven well water system, electric lights and street railroads, National and savings banks, the County Asylum and Orphans' Home, a public park of about 40 acres, public library, high school, and (1900) an assessed property valuation of $5,138,525. Pop. (1890) 8,261; (1900) 10,609; (1910) 17,010.

Koko-nor, or **Kuku-nor,** a lake of Tibet, near the frontier of the Chinese province of Kan-su, fills a depression surrounded by mountains, and lies, according to Prjevalsky, 12,097 feet above the level of the sea. Its very salt waters, exquisitely blue in color, cover 66 miles by 40. It contains five islands, one with a Buddhist monastery.

Kokoona, a genus of *Celastraceæ*. *K. zeylanica* is a tree with a pale-colored bark, found in the West Indies and in Ceylon. Thwaites says that an oil is expressed from its seeds, which is used for burning in lamps, etc. The yellow, corky bark, mixed with ghee, is used in the preparation of a snuff intended to produce a discharge of mucus from the nostrils and relieve headache.

Kokra Wood, or **Cocus Wood,** the wood of an Indian tree, *Lepidostachys Roxburghii,* which belongs to a very small natural order, *Scepaceæ.* It is imported into Great Britain in logs of six or eight inches in diameter, having the heart-wood of a rich deep brown color and very hard; and is much used in the manufacture of flutes and other musical instruments.

Kola, a place of only 770 inhabitants, but worthy of notice as the extreme N. town of European Russia. It is situated on the peninsula of Kola, is the capital of Russian Lapland, and has a capacious harbor.

Kola Nut, the product of a tree whose habitat is a West African region stretching 500 miles from the coast into the interior, between Sierra Leone and Lower Guinea. The tree is from 20 to 30 feet high, has smooth cylindrical branches, and bears a profusion of purplish flowers. The flower yields a large brownish-yellow fruit, which enfolds in the same follicle the red and white seeds that are inaptly called kola nuts. The tree begins to bear in its fourth or fifth year, but attains its greatest fecundity only in its tenth. It then yields annually about 120 pounds of seeds. They are gathered in October and November from a June flowering, and again in May and June from a December flowering Within a few years the nut has passed from the narrow function of delectating barbaric aborigines into an extensive service of civilized man. An analysis of it shows that it contains nearly all the constituents of coffee, tea, and cocoa, and other constituents not possessed by them. It has a larger proportion of caffeine than coffee or (except in rare instances) tea, and more theobromine than cocoa.

Kolberg. See COLBERG.

Kölcsey, Ferencz (kul'chā-i), a Hungarian poet; born in the County of Middle Szolnok, Aug. 8, 1790. He wrote ballads, songs, satires, short novels, critical treatises, and orations, but is best known in literature by his verse. Of his short poems, two of the best are his famous national hymn and the ballad "Beautiful Lena." He died in Pest, Aug. 24, 1838.

Kolguef, or **Kalguef** (käl'gwef), an island of Russia, in the Arctic Ocean, belonging to the province of Archangel; area, 1,350 square miles. It is visited in summer by fur hunters, walrus hunters, and fowlers, who capture eider ducks, swans, and other sea birds that yield down. The only permanent inhabitants are a few Samoyedes.

Kolin, or **Kollin,** a town of Bohemia, on the Elbe; 38 miles E. by S. of Prague. A great battle was fought, June 18, 1757, in its vicinity between 54,000 Austrians under Marshal Daun and 31,000 Prussians under Frederick II. The latter were defeated with a total loss of 14,000 men; the Austrians lost 8,000.

Kollar, Jan, a Slavonic poet and scholar; born in Mossocz, Hungary, July 29, 1793. His first work was a volume of "Poems" (1821); this was followed by an enlarged edition of the same entitled "The Daughter of Glory" (1824), his greatest work. He also published a collection of Slavonic "Folk-songs" and some books on the Slavonic peoples and languages. He was made Professor of Archæology at Vienna in 1849, and died there, Jan. 24, 1852.

Köln. See COLOGNE.

Koltsov, or **Kolzov, Aleksei Vasilievitch** (kōlt'sof), a Russian lyric poet; born in Voronesch, Oct. 14, 1809. A dealer in cattle and wood, devouring books in a friendly bookseller's store, he became "the Burns of Russia." His poems, few in number (124), the best of them treating of peasant life, short and even almost uncouth, introduced a new form of art. Their diction was inimitably original and natural, their feeling deep and true; they won their author consideration in the highest Russian literary circles. Good specimens of them are "The Harvest"; "The Young Reaper"; "The Forest." He died in Voronesch, Oct. 31, 1842.

Koluri. See SALAMIS.

Koluschan (kō-lösh'an), a linguistic stock of North American Indians. They comprise some 10 or 12 tribes, numbering about 6,000, nearly all of whom live in Alaska.

Kolyma (kōl-ē-mä'), a river of Eastern Siberia, flowing from the Stanovoi Mountains 995 miles N. E. of the Arctic Ocean. It is only free from ice during 11 weeks in the year. Its waters are full of fish.

Kom. See KUM.

Komorn, a town and fortress in Hungary, on the island of Schütt, in the Danube. The town is irregularly built, with narrow, gloomy streets. The fortress, one of the strongest in Europe, commenced in the end of the 13th century, was greatly enlarged and strengthened by Matthias Corvinus; the fortifications were again restored and improved in 1805–1809. It requires for its defense at least 15,000 men and 400 pieces of artillery. Though taken by Ferdinand I. in 1527, it successfully withstood the Turks in 1543, 1594, and 1663. Klapka held it for the Hungarians against the Austrians from October, 1848, to September, 1849. Pop. (1900) 16,816.

Kondratóvicz, Vladislav (kŏn-dra-tŏ′-vĭch), pseudonym LADISLAS SYROKOMLA, a Polish poet; born in Smalkov, Sept. 17, 1823. Though he himself considered "Margier" (1855), a dignified epic founded on early Lithuanian history, his best work, beside or even above it must be placed the epic "John Demborog" (1854), based on a family legend. He wrote also in prose, including a "History of Polish Literature" and several dramas; and made some translations. He died in Vilna, Oct. 15, 1862.

Kong, a district of West Africa, along the upper course of the Comoe (mouth at Grand Bassam on the Ivory Coast), and measuring some three degrees of longitude. The district is a plateau whose average elevation is 2,300 feet above sea-level, rising in a few groups of peaks up to 6,000 feet. The Kong Mountains of the geographers are affirmed by Binger to be merely isolated granitic peaks only 300 feet above the plateau. The people, Mandingoes by race and Mohammedans by religion, manufacture cotton stuffs and carry on indigo dyeing. The capital of the state is the town of Kong, with from 12,000 to 15,000 inhabitants. This district was declared a protectorate of France in 1889.

Kong-Fu-Tse. See CONFUCIUS.

Kongo, French. See FRENCH KONGO.

Kongo Free State, a territory in Africa which, recognized by the European powers assembled at the conference at Berlin in 1885, has the following boundaries: The N. bank from the mouth, with a strip of territory averaging about 60 miles in width, as far as Manyanga, about 240 miles from Banana, the entrance part of the river. At Manyanga the French territory commences and continues along the N. bank, passing Stanley Pool as far as the Mobangi. The territory of the Kongo Free State recommences at this river, and the boundary line runs along the left bank as far as the 4th parallel of N. latitude, which then becomes the N. boundary of the central portion of the state. On the N. E. it extends to the watershed of the Kongo basin, E. to lon. 30° E. and Lake Tanganyika, S. E. to Lake Bangweolo and the S. watershed of the Kongo basin as far as Lake Dilolo, S. W. to the Kassai river, to lat. 7° S., the Kwilu, the Kwango, and the parallel of Nokki. These boundaries were only finally settled by the neutrality declarations of 1894 and 1895, after a series of treaties. The area is stated at 900,000 square miles; pop. (1901) 30,000,000. The Kongo Free State is governed by an administrative bureau at Brussels, consisting of three secretariats — Control, Finance, and Foreign Affairs, under the direct supervision of the government of Belgium; also by an administrator on the Kongo who has his headquarters at Boma, 60 miles from the sea, on the right bank of the river. The state has stations at Banana, Vivi, Boma, and Matadi on the Lower Kongo; at Lukungu, Issangila, Manyanga, Lutete on the Middle Kongo; and at Leopoldville, Kinshassa, Kwamouth, Lukolela, Equator, Bangala, and Stanley Falls on the Upper Kongo. Besides these the state has erected two stations on the Kasai, Luebo, and Luluaberg. All imports are free, and only such export duties are levied as are necessary to carry on the work of administration. It has a coinage and postal service and has entered into the Postal Union. A road has been surveyed between Matadi and Leopoldville, and by the introduction of ox wagons the facilities for transport are largely increased. It is intended to follow this up by a railway. Its present income is derived from an endowment of $200,000 a year bestowed upon it by His Majesty the King of the Belgians, and such other sums as are produced by its export dues.

The inhabitants of the Kongo basin belong to what has been termed the Bantu race. They are a happy, inoffensive people, not so dark as the Fan or Ethiopian. Split up into numberless tribal communities, they can offer but slight resistance to the advance of civilization; and as they are born traders, they take very readily to commerce. The dialects throughout the country are very numerous, but many of them would appear to have a common origin. Even the Swahili language, spoken by the natives of Zanzibar (who come as porters, etc., into this region), has much in common with the Kishi Kongo, or language spoken on the W. coast. The religion is mainly fetichism; and domestic slavery exists everywhere. The name of French Kongo is now given to what was known as the Gaboon territory; and Portuguese Kongo is the coast country to the S. of the independent state. The climate of the Kongo State is tropical, the average temperature ranging between 78° and 82°. Malarial fevers, especially on the coast, are not infrequent; but with care and attention to diet Europeans can remain in the country for several years without change. The interior is more healthy than on the coast. The principal products are ivory, palm oil, palm kernels, india-rubber, various gums, ground nuts, camwood, beeswax, orchilla; also coffee, tobacco, hill rice, maize, and sorghum. Tropical fruits, such as bananas, pineapples, and mangos, abound. The total value of the special exports of the independent state proper vary in value from 5,000,000 to 8,000,000 francs; the general exports from 8,000,000 to about 15,000,000 francs. A railway 250 miles long connects Matadi and Stanley Pool, and another, Stanleyville with Ponthierville. In 1889 the

king of Belgium bequeathed his rights in the State to Belgium; and in 1908 the Free State was annexed to Belgium.

Kongo River, a Central African river, which Stanley proposed to call the Livingstone. At its mouth on the Atlantic seaboard the Kongo is an immense body of water, nearly 10 miles wide, and over 1,300 feet in depth. Its upper course remained unknown till Stanley identified the Kongo with the Lualaba, and so connected it immediately with the great system of lakes S. and W. of Lake Tanganyika, and less directly with Tanganyika iself. Stanley and his followers, striking the Lualaba (known higher up as Chambezi and Luapula) at Nyangwe (1876), followed its course persistently in the face of enormous difficulties, fighting no less than 32 battles; till (Aug., 1877), he found it, after "changing its name scores of times," reached the Atlantic as Kongo, Kwango, and Zaire. From the Chibalé Mountains to its mouth it has a length of 2,900 miles; by its great and numerous tributaries (such as the Alima, Kwango, Kasai, Ruru) it is said to drain an area of 1,300,000 square miles. It has but one mouth and no delta, and brings down a volume of water exceeded only by the Amazon. From its mouth, 10 miles wide, a steamer drawing 15 feet can steam up 110 miles. From the great lake-like expanse of Stanley Pool vessels can steam 1,000 miles into the heart of Africa.

Konia. See ICONIUM.

König, Ewald August (kuh'nig), a German novelist; born in Barmen, Aug. 22, 1833. He wrote a long list of works, most of them dealing with crime. Some of the best are: "Through Conflict to Peace" (1869); "Guilty?" (4 vols. 1878); "A Lost Life" (2 vols. 1882); "The Golden Cross" (2 vols. 1883); "A Modern Vampire" (3 vols. 1883); "The Daughter of the Councillor of Commerce" (1886); "Shadows of Life" (2 vols. 1885); "On Dishonor's Path" (1885). He died in Cologne, March 9, 1888.

König, Freidrich, a German inventor; born in Eisleben, April 17, 1774. He became a printer, and at the same time eagerly prosecuted scientific studies. Having devoted himself to the invention of means of printing by machinery, he applied in vain for the necessary pecuniary assistance in various quarters, his schemes being rejected as impracticable; but at last Thomas Bensley, a printer in London, came forward to his support, and a patent was obtained in 1810 for a press which printed like the hand press by two flat plates. A second patent was obtained in 1811 for a cylinder press, and others in 1813 and 1814 for improvements on it. This improved machine was adopted in 1814 by the proprietors of the London "Times." In the latter part of his life König was a partner in a company for making steam printing presses at Oberzell, near Würzburg, in Bavaria. He died Jan. 17, 1833.

König, Heinrich Joseph, a German novelist; born in Fulda, March 19, 1790. He wrote a series of excellent historical novels, of which the best were: "The Noble Bride" (2 vols. 1833) and especially the artistic and admirable "Club Members of Mayence" (3 vols. 1847). The latter is his best work, and describes the political and religious influence of the French Revolution in Germany toward the end of the 18th century. "William Shakespeare" (1850) was a successful attempt to depict in a novel the great English dramatist and his time. He died in Wiesbaden, Sept. 23, 1869.

Königgrätz (-grāts), a town of Bohemia, Austria, on the Elbe; 73 miles E. by N. of Prague. It is the seat of a bishop, and has a Gothic cathedral. A signal victory was gained here by 240,000 Prussians over 220,000 Austrians on July 3, 1866. The Prussian loss was 9,000 men, the Austrian 21,000, with 22,000 prisoners. The Austrians name the battle Sadowa from an adjoining village nearer the center of the battlefield. Pop. (1900) 9,773.

Königsberg, a town and fortress in East Prussia, Germany, on the Pregel river; 366 miles N. E. of Berlin. The original nucleus of the place was the blockhouse built in 1255 by the Knights of the Teutonic Order, but, though founded so long ago, Königsberg is a modern town; scarce any of its old buildings now exist. It was the headquarters of the grandmaster of the Teutonic Order, and from 1525 to 1618 was the residence of the Dukes of Prussia. In the castle chapel (built in 1592) Frederick I. crowned himself first king of Prussia in 1701, and William I. was crowned in 1861. The Kneiphof parish church is a Gothic structure, erected in 1333 and thoroughly restored in 1856; in an adjoining building KANT (*q. v.*) lies buried. The university was founded as a Lutheran institution in 1544, and rebuilt in 1844–1865. Connected with it are an observatory (1811), a zoölogical museum (1819), a botanical garden (1809), a library of over 200,000 volumes, together with the usual laboratories and collections. Pop. (1905) 223,770. The town was first fortified in 1626; but was converted into a modern fortress of the first class in 1843 and the following years. By the treaty signed here in 1656 the duchy of East Prussia acknowledged the suzerainty of Sweden, instead of Poland. Königs-

berg was occupied by the Russians in 1758 and by the French in 1807.

Königstein, a fortress of Saxony, once regarded as impregnable, but now of no military importance, on a rock 800 feet above the Elbe, 24 miles S. E. of Dresden. Here the Saxon army yielded to Frederick the Great in 1756.

Königswinter, Wolfgang von. See MÜLLER, WOLFGANG.

Konkan, the name given to the strip of coast districts in Bombay presidency, India, extending from Gujarat on the N., past Goa, as far as the S. limit of North Kanara district; the breadth varies from 1 or 2 to 50 miles, as the Western Ghâts approach or recede from the sea; area 16,415 square miles; pop. (1900) about 5,000,000. The Konkan is rather a geographical than an administrative division, and includes, besides North Kanara, the British districts of Ratnagiri, Kolaba, and Thana, Bombay city and island, the native states of Jawhar, Janjira, and Sawantwari, and the Portuguese territory of Goa. The common language is Marathi. The mean annual rainfall is over 100 inches; the monsoon, arrested by the lofty barrier of the Ghâts, sends down a great body of water, and numerous streams abound.

Konstanz. See CONSTANCE.

Koodoo, a beautiful antelope, slate-gray, with transverse white markings. The males with spirally twisted horns, about four feet long; the females hornless; height about five feet at the shoulders. Extends from South Africa to Abyssinia.

Koolokamba, an anthropoid ape shot by Du Chaillu in the forests of Western Equatorial Africa. The shoulders are broad, the ears large, the arms extend below the knee; the limbs adapt it to go on all fours and to climb trees; the waist is as broad and thick as the chest; the breastbone is protuberant; the belly is very large and the stomach large. It feeds on vegetables. It has affinities to the gorilla, the chimpanzee, and the nschiego.

Koopman, Harry Lyman, an American author; born in Freeport, Me., July 1, 1860. He was graduated at Colby College in 1880; was assistant cataloguer at the Astor Library and those of Columbia, Cornell and Rutgers Colleges in 1881–1886; of the library of the University of Vermont in 1886–1892; in 1893 became librarian of Brown University.

Kooria Mooria Islands. See KURIA-MURIA ISLANDS.

Koorsee Text, the 256th verse of the 2d chapter of the Koran. It is also known as the Throne verse, from the Arabic *Koorsee,* supposed to be God's seat of justice. It allegorically signifies divine providence. The verse runs thus:

> "God, there is no God but He, the living, the self-subsistent. Slumber takes him not, nor sleep. His is what is in the heavens and what is in the earth. Who is it intercedes with Him save by His permission? He knows what is before them and what is behind them, and they comprehend not aught of his knowledge but of what he pleases. His throne extends over the heavens and the earth, and it tires Him not to guard them both, for He is high and grand."

Professor Palmer says it is "considered one of the finest passages in the Qur'ân, and frequently found inscribed in mosques and the like." Sale says that "Mohammedans recite it in their prayers, and some of them wear it about them engraved on an agate or other precious stone."

Kootenay, a river in British Columbia, 300 miles long, noted for its curvature. It flows through a pleasant region named also Kootenay.

Kopisch, August (kop'ish), a German poet; born in Breslau, May 26, 1799. Also an artist, he was an artist in his verse, which was precise in form and largely descriptive; it can be best seen in "Poems" (1836) and "All Sorts" (1848). His ballads particularly were exquisitely humorous and brisk. Two extremely popular productions of his were the "Story of Noah" and the droll "Heinzelmännchen" (The Brownies). He died in Berlin, Feb. 3, 1853.

Kopp, Josef Eutychius (kop), a Swiss historian; born in Beromünster, Luzern, April 25, 1793. The first to apply the scientific method of studying history in Switzerland, to him we owe our modern views of old Swiss legends, especially of that of William Tell. His chief work was "History of the Allied Leagues" (1882). He has been called the 'Niebuhr of Switzerland." He wrote also four volumes of dramatic poems (1855–1856). He died at Luzern, Oct. 25, 1866.

Koppel, Franz (kop'el), a German miscellaneous writer; born in Eltville, Nassau, Dec. 7, 1840. Among his works are the heroi-comic poem, "Cervantes on his Travels" (1865); "Two Brothers in Christ" (1867), a romance; several comedies, including "Which Meyer?" "Useless to Worry," "On Thorns"; "Spartacus," a tragedy; the dramas "Hans in Luck" (1885), and "Albert the Brave" (1889). He wrote also opera librettos and celebration poems.

Koppernigk. See COPERNICUS.

Koproli, or **Kuiperli Mehemet,** grand vizier of Turkey during the minority of

Amurath IV. He remained in power till his death. He was a sagacious governor, and filled the treasury, which had been emptied by the prodigality of the previous reigns. He was, however, cruel and relentless to those who gave him offense. He died in 1661.

Koproli, Achmet, son of the preceding, succeeded his father as grand vizier. He made war against Hungary in 1662, and lost, in 1664, the battle of St. Gothard, against Montecuculi, but concluded an advantageous peace at Temeswar. In 1669 he took Candia. He died in 1675.

Koproli, Mustapha, son of the preceding, was grand vizier under Soliman III. He made war in Hungary. He took Widdin and Belgrade, and was killed at the battle of Salenckemen, in 1691.

Koproli, Niuhman, son of the preceding, was nominated by Achmet III. grand vizier in 1710. He remained in power only two months. He was the victim of a strange hallucination, believing that he had a fly constantly on his nose. A French physician cured him, by feigning to perform an operation upon the feature, and afterward showing him a dead fly, with which he had previously provided himself.

Koptos, a town in Upper Egypt; on the E. bank of the Nile river near the Red Sea, in lat. 26° N. It is of no importance at present. In years past it was a town widely known for its large trade, it being at the W. end of the caravan route over which the products of Plunt, Arabia, and the East were generally carried to Egypt. This route was afterward changed, first to Kus and later to Neneh. It had quarries and gold mines, and is supposed to have had a large Phœnician population.

Korais, or **Koray, Adamantios,** a classical scholar and patriot; born in Smyrna April 27, 1748. Very early he studied the ancient and modern language. In 1782 he went to Montpellier to devote himself to the science of medicine and natural history. In 1788 he settled in Paris where he remained till his death. Korais is the foremost and earliest regenerator of modern Greek literature. By his writings he contributed largely to the political reawakening of Greece. He died April 6, 1833.

Koran (*Al-Korân,* that is *the Koran,* which means originally "the reading, or that which is to be read"; also called *Forkan,* salvation; also *al Moshaf,* the volume; *al Kitah,* the book; *al Dhikr,* the recollection or reminder) the religious code of the Mohammedans, written in Arabic by Mohammed. In size it is about equal to the New Testament. It is divided into 114 *surahs* or chapters, each of which begins with the phrase "In the name of God." Many of them have strange inscriptions, such as "Congealed Blood," the "Fig," the "Star," "The Towers," the "Quaking Earth," etc. These surahs are again divided into *ayaths.* Another division is into 30 *ajza* and 60 *ahzâl.* The parts, originally thrown together miscellaneously into a box after they were written, were collected into a volume without any attempt at arrangement soon after Mohammed's death, at the command of Mohammed's father-in-law and successor Abu Beker, by Zaid Ibn Thâbit. This form of the Koran contains all the various readings that had crept into the text, and in order to remove these Caliph Othman caused a new copy to be made from the original fragments in the 30th year of the Hegira A. D. 652, and then ordered all the old copies to be destroyed. According to the Mohammedan doctrine, it was written from the beginning in golden rays on a gigantic tablet in heaven, and was communicated to the prophet on the night of Al-Khadr, in the sacred month of Rhamadân by the angel Gabriel precisely as it stands, verse for verse, chapter for chapter, written on parchment made of the skin of the ram which Abraham sacrificed in the place of his son Isaac. The volume was ornamented with precious stones, gold, and silver, from paradise.

According to other traditions Mohammed is said to have drawn up the Koran with the assistance of a Persian Jew, Rabbi Warada Ibn Nawsal, and a Nestorian monk, the abbot of the convent of Addol Kaisi, at Bosra, in Syria; but nothing certain is known respecting these two persons, though it appears beyond a doubt, less from the author's doctrines than from the expressions (such as Gan Eden, the term he uses for paradise; Gehinnom, equivalent to the Hebrew *Gehenna,* the name he uses for hell; Sabbath, the word he adopted for the day of rest, etc), his tales, and his mentioning several prophets, etc., that he was acquainted with the religions of the Jews and Christians. His knowledge appears to have been derived, however, more from oral intercourse with adherents of these creeds than from an extensive acquaintance with their sacred books. Of the sacred writings of the Jews he cites only the Pentateuch and the Psalms. In chapter xxi. he represents the Almighty as saying, "I have promised in the books of Moses and in the Psalms that my virtuous servants on earth shall have the earth for their inheritance." Of the New Testament he cites nothing whatever. Not only was he acquainted with the religious systems of the Jews and Christians, but also with those of the Sabæans and Magians, from all of which he seems to have drawn materials which he incorporated into a system, after the idea of establishing a religion in his country, where numberless

Koran

sects of Pagans, Jews, Christians, Sabæans and Magians existed, had risen in his mind.

He lived, as is well known, much in solitude, where he doubtless meditated on his doctrine and the great mission which he thought himself called upon to accomplish. He does not reject the doctrines of any sect, but takes from all. He asserts that he wishes to restore the true faith to its purity. The unity of God is his fundamental doctrine, which is clearly laid down in the symbol of the Moslem — "God is God, and Mohammed is his prophet." The unity of God is the very aim of his mission, and according to him had been the essence and the basis of all true religion, with which ceremonies and customs were only accidentally connected. Thus he says in chapter xi. of the Koran, "We make no difference between that which God has taught us and that which Abraham, Isaac, Ishmael, the twelve tribes, Moses, and Jesus have learned from the Lord. We believe in God, and are Moslem." And in chapter iv. it is said, "God commands thee to receive the religion which he prescribed to Noah, which he has revealed unto thee, and which he imparted to Abraham, Moses, and Jesus." To Christ he assigns a place in the seventh or highest heaven, in the immediate presence of God. Besides the fundamental doctrine of the unity of God, the Koran establishes several other articles of faith. Thus, in chapters iv., vi., vii., and xlviii., the doctrine of good and bad angels is set forth, which was general with the Arabians before Mohammed. Mohammed returns most frequently to the doctrine of the resurrection and the last judgment. The way in which he endeavors to set it forth has much similarity with that of St. Paul. He even borrows expressions from the Jewish and Christian scriptures when he speaks of the last judgment. In chapter xliii. it is said "When the trumpet sounds the second time they shall rise quickly from the graves to appear before God"; and further, "A sound of the trumpet of judgment will assemble all men before my throne, and every one shall there receive the reward of his deeds."

In regard to the form of the last judgment Mohammed followed the doctrines of the Jews and Magians; for instance, the passage of the narrow bridge Al-Sirat, the book in which all the actions of men are set down and the scale in which they are weighed. Mohammed's paradise, too, is quite Jewish and Magian. Another dogma is set forth in the Koran, yet not explicitly, that of the unchangeable decrees of God. Mohammed used the doctrine of predestination with great success to infuse into his adherents undaunted courage, which elevated them above all perils. Probably he adopted in this case views already widely spread. With the Sabæans the belief in predestination was firmly established, and founded on the unchangeable course of the stars and their influence upon the life and actions of men and the course of events. With the Magians this doctrine followed from their system of the good and evil principles, and probably it had passed from both to the Arabians. In regard to religious exercises, too, Mohammed adopted such as he found, giving more universality and precision to those which were vague. The Koran prescribes prayer, fasting, alms, and the pilgrimage to Mecca. The first includes everything relating to the purifications and ablutions by which the faithful prepares himself for prayer. Mohammed considered this exercise of the greatest importance. When the Tayesites sent an embassy to the prophet to request him to absolve them from the troublesome observance of this exercise his answer was, "Religion is nothing without prayer." In another passage he calls prayer the "key to paradise." He surpassed the severity of the rabbis, and prescribed prayer five times a day with the face turned toward Mecca. Turning the face during prayer toward a certain point is a common custom with the Orientals. It was particularly so with the Jews, Sabæans, and Magians, who call the point to which they turn *kebla*. In the beginning Mohammed adopted the same *kebla* with the Jews, that is, the city of Jerusalem. In the second year he changed the *kebla* to Mecca.

To give alms was always a particular trait of the Arabians, but Mohammed made it obligatory. The pilgrimage or something similar had existed with most sects before him. In respect to the civil laws relating to polygamy, divorce, inheritance, etc., Mohammed followed step for step the law of Moses and the decisions of the rabbis, only adapting them to the customs and prejudices of his countrymen. Excepting the worship of idols, which was positively against his fundamental doctrines, he attacks few old customs; and though he prohibits the use of inebriating liquors, and requires fasting, yet he says, "God intended that his religion should be easy, else, as he well knew, you would only become hypocrites" — a sentiment probably caused by the state of the Christian and Jewish sects with which he was acquainted. The Koran is written in prose, but the different parts of a sentence end in rhymes. As the work was written at different times, in different moods, and on different occasions, there is naturally great diversity in the style of different passages. While the earliest passages are frequently characterized by outbursts of a wild, unbridled fancy, such as in some measure to justify the sneers which the people of Mecca cast on Mohammed as a poet, prophet,

and possessed person, the later passages exhibit greater calmness and a more subdued imagination. The most elevated portions are those which speak of the greatness of God, and those which describe the scenes of the last judgment, the pleasures of paradise, and the pains of hell, though the latter especially are often offensive to a European taste owing to the excess of hyperbole.

The language of the Koran is considered the purest Arabic, and contains such charms of style and poetic beauties that it remains inimitable. Its moral precepts are pure. A man who should observe them strictly would lead a virtuous life. It inculcates obedience to God, charity, mildness, abstinence from spiritous liquors, and toleration, and ascribes particular merit to death in the cause of religion. "From the Atlantic to the Ganges," says Gibbons, "The Koran is acknowledged as the fundamental code, not only of theology, but of civil and criminal jurisprudence; and the laws which regulate the actions and the property of mankind are guarded by the infallible and immutable sanction of the will of God." The divinity and authority of the Koran were contested, as early as 740 A. D., under the caliphate of Hescham by Djeab Ibn Dirhem. This heresy was checked by the execution of its author, but it reappeared about 70 years later, and was finally subdued only when Harun II., in 842, prohibited the nature of the Koran from being discussed. The Koran is now regarded with great reverence in Mohammedan countries. It is daily read once through in the mosques of the Sultan and the adjoining chapels. Mohammedans never touch it without previous purification and never carry it below the girdle. Texts taken from it are frequently written on doors, walls of rooms, banners, etc. The commentaries upon it are exceedingly numerous. The library of Tripoli, in Syria, is said to have contained no less than 20,000. The most celebrated are those of Samachshari (belonging to the 6th century of the Hegira), Beidhavi (8th century), Mahalli (9th century), and Soyuti (9th century). That of Beidhavi was edited by Fleischer and published in Leipsic in two vols. (1844–1848). The Koran is said to have been printed in the Arabic text about the year 1530 by Paganini of Venice, but no copy of this edition, if there ever was such, has come down to us. The whole impression is said to have been destroyed at the command of the Pope. The earliest edition of the Koran at present known is by Abr. Hinkelmann (Hamburg, 1694, 4to); another, with a good Latin translation by Maracci (Padua, 1698, fol.); a fine edition, now very rare, was published by order of Catharine II. by Mollah Usman Ismael (Petersburg, 1787, small folio; new edition, 1790 and 1793; reprinted, Kasan, 1809, fol.); another edition appeared at Kasan in large 4to in 1803, and several have been published at Calcutta, Teheran, and other places in India and Persia, with Indian and Persian translations and commentaries, but these last editions are of small critical value. Another European edition, prepared by Flügel, was published at Leipsic (last edition, 1870).

Kordofan, or the White Land, a large province of the Egyptian Sudan; separated from Sennaar on the E. by the White Nile, and from Dar-Fûr on the W. by a strip of desert; area estimated at 41,500 square miles; pop. 280,000, of whom three-fourths are slaves. The province is traversed by no rivers; but water is found almost everywhere at a comparatively short depth. The surface is undulating. The chief produce of the soil is millet, the principal food of the inhabitants. Gum trees, mimosas, thorny plants, and prickly grass are common, but there is no forest timber. Gums, hides, ivory, ostrich feathers, and gold are exported. Three-fifths of the population are settled; the rest are nomadic. The aborigines belong mainly to the Nuba stock, but use a negro tongue and are mostly pagans. There is a large element of nomad and slave-hunting "Arabs," Moslems in faith. The capital is El-Obeid, with about 30,000 inhabitants, in the center of the country. In the end of the 18th century Kordofan was conquered by the ruler of Sennaar, then by the sultan of Dar-Fûr; in 1821 it was annexed by Mehemet Ali of Egypt, but was lost to the Egyptians by the Mahdi's revolt in 1883. When the Egyptian Sudan was officially organized in 1899, Kordofan became one of its provinces.

Korea, a former empire in Asia, between the Yellow Sea and the Sea of Japan; absorbed by Japan in 1910, and re-named CHO-SEN (Land of Morning Calm). It has a coast line of about 1,740 miles, and a total area of about 90,000 square miles. The N. boundary line is formed by the river Tu-man flowing N. E., and the Amnok flowing S. W. from the watershed of Paik-to-san. The Tu-man, for the last 5 miles of its course, separates Russian Asia from Korea. A belt of land, 5,600 square miles, on the N. side has for the last three centuries been constituted a neutral zone between Korea and Manchuria, but is now being gradually encroached upon both from the Chinese and Korean side. Native statistics show a pop. of about 5,340,901. Other estimates put it at double. Seoul, the capital, has a pop. of about 150,000.

Occupying about the same latitude as Italy, Korea is also like Italy hemmed in on the N. by Alpine ranges, and traversed from N.

Korea

to S. by a branch chain. From the N. the chain runs close to the coast till, about the 37th parallel, it trends inland. The chain rises in elevation from the N. to the center, throwing out feelers to the W. which break up the country into a series of narrow valleys debouching on the sea. Precipitous on the E., the chain slopes toward the broader W. side, which is accordingly the more developed part; though Kyöng-sang province in the S. E. is one of the richest in Korea. Korea is on the whole very mountainous. Among the summits are Hien-fung, measured from sea at 8,114 feet high, though later travelers deem this height an exaggeration; Mount Popoff, at 37th parallel; Coxcomb, N. E. of Seoul, rises to 4,800 feet. The mountains are mostly of Primary rock; those of Hwang-hai-do are, however, Mesozoic, and about the center are lava and volcanic rocks. The chief rivers on the W. coast are Keum, navigable for boats drawing 4½ feet 30 miles up; Han, navigable to a little above Seoul, 80 miles; Tai-dong, navigable to Phyöng-yang, 75 miles; Am-nok, far the greatest, navigable to above Wi-wön, 175 miles. Flowing through beautiful, well-timbered mountains, the Am-nok has many affluents, and in the summer floods its waters rise to full 40 feet even where a mile or more wide. In the S. E. the Nak-tong is navigable for boats drawing 4½ feet for 140 miles up.

The climate is healthy, bracing in the N., but colder in winter and hotter in summer than in corresponding European latitudes. The heat is tempered by sea-breezes, but in the narrow inclosed valleys becomes very intense. The Han is frozen in winter so as to be available at Seoul, where it is 400 yards broad, for cart traffic three months in the year. The Tu-man is usually frozen five months in the year. Various kinds of timber trees abound, except in the W., where wood is scarce and is sparingly used; and in other parts the want of coal has caused the wasteful denudation of many hillsides. The fauna is very considerable, and besides tigers, leopards, deer, includes pigs, tiger-cats, badgers, foxes, beavers, otters, martens, and a great variety of birds. Among the products are rice, wheat, beans, cotton, hemp, maize, millet, sesame, perilla. Ginseng grows wild in the Kange Mountains, and is also much cultivated about Kai-söng, the duties upon it, notwithstanding much smuggling, yielding about $500,000 annually. The domestic animals are few. The cattle are excellent (the bull being the usual beast of burden), the ponies very small but hardy, fowls good, pigs inferior. Iron ores of excellent quality are mined; and there are copper mines in several places. The output of silver is very small; in 1886 the customs returns showed the value of gold exported that year to be $503,296. Three-fourths of the trade is with Japan, and over a fifth with China. The government is a hereditary and practically absolute monarchy, and carried on through three ministers, besides whom are ministers of six departments. Caste is very powerful, and no office of even only local importance is held by others than a noble. In some districts the people live in a very squalid condition, and mud hovels thatched with straw are the usual houses everywhere; but beggars are rare, and absolute distress is seldom met with.

The earliest records of Korea go back to 1122 B. C., when Ki-tze with 5,000 Chinese colonists brought to Korea Chinese arts and politics. Down to modern times Korea has remained perfectly secluded. Almost the first knowledge of Korea obtained by Europe was through the shipwreck of some Dutchmen on the coast in 1653. The missionary De Cespedes had, however, entered Korea at the end of the 16th century, and from 1777 other missionaries followed. In 1835 Maubant gained a footing in Korea, but in 1866, after thousands of converts had been put to death, the only three Catholic missionaries left had to flee for their lives. To avenge the death of the Catholics the French sent an expedition, which was, however, repulsed, while a stranded American schooner was burned with her crew in sight of Phyöng-yang. Japan was the first to effect a footing in Korea in 1876, when a treaty was concluded between the two countries. Korea followed this up by treaties with China and the United States in 1882; with Germany and Great Britain, 1883; with Italy and Russia, 1884; and with France, 1886. The three ports opened to foreign trade are Chemulpo, Fusan, and Gen-san. The suzerainty of China had been acknowledged by Korea from early times, but Japan protested, and this was one of the alleged causes of the Japanese-Chinese War of 1894. China renounced her claim in 1895 and Japan began to display an active interest in Korea. Russia thereupon claimed a voice in Korean affairs. (See RUSSO-JAPANESE WAR.) The Treaty of Portsmouth recognized the suzerainty of Japan in Korea. In contravention to this treaty, a delegation was sent in 1907 by the Emperor of Korea to the second Hague Peace Conference, requesting protection against Japan. The Emperor was compelled to abdicate, the Crown Prince elevated to the throne, and supreme control given to Japan by a new convention. This was the end of Korea's independence.

Koren, John, an American statistician; born in Decorah, Ia., March 3, 1861; was graduated at Luther College in 1879 and at Concordia Seminary, St. Louis, in 1882; and later studied in Europe. He was engaged in religious work for some time; became a special expert abroad for the United States Department of Labor in 1891; was sent to Europe to study the Gothenburg system in 1893; and was a member of the committee to investigate the liquor problems in 1894–1899. He was the author of "Economic Aspect of the Liquor Problems," "The Liquor Problem in its Legislative Aspects," etc.

Körner, Karl Theodor (kur'ner), a German poet; born in Dresden Sept. 23, 1791. After irregular studies at Freiberg, Leipsic, and Berlin, young Körner, through Kotzebue's influence, was appointed dramatist to a Vienna theater; for it he wrote some light comedies, such as "The Green Mask" and "The Night Watches," and some tragedies, of which "Zriny," a work full of noble enthusiasm, was the most successful. The uprising of the German nation against Napoleon inspired K rner with patriotic ardor. He not only displayed heroic personal courage in many encounters, but encouraged his comrades by fiery patriotic songs. These, published in 1814 under the title of "Lyre and Sword," are regarded by the Germans with a kind of sacred admiration, and have gone through a great number of editions. The most famous of these pieces is the "Sword Song," composed in a pause of battle, and only a few hours before the author fell in a skirmish, between Schwerin and Gadebusch, Aug. 26, 1813.

Kornthal, Society of, a religious community in the kingdom of Würtemberg, founded by one Hoffman, a burgomaster of Leonberg. Perceiving that a difference of religious belief led many of the inhabitants to emigrate to other countries, he thought that this would be prevented if dissenters were removed from under the jurisdiction of the Lutheran consistory, and were allowed the free exercise of their own religious worship. In 1819 he obtained a royal edict granting relief and toleration to about 40 families of dissenters, who bought the lordship of Kornthal, about two leagues from Stuttgart, and formed themselves into a community somewhat after the Moravian model. Their numbers, for a period, rapidly increased. Their mode of worship nearly resembles that of the Protestant churches, and their discipline resembles that of the Moravian Brethren.

Korolenko, Vladimir Galaktionovitch (kō″-rō-len'kō), a Russian novelist; born in Zhitomir, Volhynia, July 27, 1853. Exiled in 1879, while still a student, to Siberia, he was pardoned in 1885. His pictures of contemporary Russian life are among the best. "Makar's Dream" (1885), his first work, was one of the most successful; "The Vagrant," etc., a volume of sketches translated into English, appeared in New York in 1888; "The Blind Musician" and "In Two Moods" (1890–1891), also exist in English; "In Bad Society" and "The Forest Murmurs" deserve their popularity.

Korosko, a small village of Lower Nubia, with a few wretched huts straggling along the right bank of the Nile, about midway between the first and second cataracts. Here the Nile boats land the goods that are conveyed by caravan to the Sudan.

Kortum, Karl Arnold (kor'töm), a German comic poet; born in Mülheim, July 5, 1745. His masterpiece, "The Jobsiad; or the Life, Opinions, and Deeds of Hieronymus Jobs, the Candidate," a heroi-comic poem, has been popular in Germany for over a century. Its doggerel verse, somewhat in the style of our "Mother Goose," its riotous thought and rhyme and wild drollery, almost place it in a genus by itself. Describing the college life as well as the previous and subsequent career of its subject, as it does, it is a great favorite with university students. He died in Mülheim, Aug. 15, 1824.

Korvei. See CORVEY.

Kosciusko, or **Kosciuszko, Tadeusz,** a Polish patriot; born in Lithuania, Feb. 12, 1746. He chose the career of arms, and was trained in France. In 1777 an unhappy love affair drove him to the United States, where he fought for the colonists and advanced to the rank of Brigadier-General. He returned to Poland in 1786. When Russia attacked his country in 1792, Kosciusko held a position at Dubienka for five days with only 4,000 men against 18,000 Russians. In spite of this the pusillanimous King Stanislaus submitted to the Empress Katherine, whereupon Kosciusko resigned his command and retired to Leipsic. After the second partition of Poland he put himself at the head of the national movement in Cracow and was appointed dictator and commander-in-chief (1794).

KOSCIUSKO.

His defeat of a greatly superior force of Russians at Raclawice was followed by a rising of the Poles in Warsaw. He established a provisional government and took the field against the Prussians, but, defeated, fell back upon Warsaw and maintained himself there valiantly till the approach of two new Russian armies induced him to march to meet them. He was overpowered by superior numbers in the battle of Maciejowice, Oct. 10, 1794; and, covered with wounds, he himself fell into the hands of his enemies. Two years later the Emperor Paul restored him to liberty. He spent the remainder of his life chiefly in France, prosecuting agricultural pursuits. When Napoleon, in 1806, formed a plan for the restoration of Poland, Kosciusko refused to lend himself to the French monarch's designs. The address to the Poles which Napoleon published in Kosciusko's name in the "Moniteur" was a fabrication. In 1814 he besought the Emperor Alexander to grant an amnesty to the Poles in foreign countries, and to make himself constitutional King of Poland. He settled at Solothur in Switzerland in 1816, and died on Oct. 15, 1817, by the fall of his horse over a precipice.

Kosciusko, Mount, one of the highest mountain peaks in Australia, in the Muniong Alps, in New South Wales, near the frontier of Victoria; 7,308 feet high.

Kosher, pure, according to the Jewish ordinances. Thus "Kosher meat" is meat killed and prepared by Jews after the Jewish manner, and so fit to be eaten by Jews.

Kossack, Karl Ludwig Ernst (kos'säk), a German feuilletonist; born in Marienwerder, Aug. 4, 1814. He introduced into Germany, through the medium of the Berlin "Monday Post," founded by himself in 1854, the French feuilleton. These piquant and very popular productions, by which he was best known, were afterward issued in book form. Among the volumes were: "Berlin and the Berliners" (1851); "From a Journalist's Waste-Paper Basket" (2d ed. 1859); "Berlin Silhouettes" (1859); "Comicalities" (1852); "Paris Stereoscopic Views" (1855); "Watering Place Pictures" (1858); "Comicalities of Travel" (2 vols. 1862); etc. A collection of his novels, "Genre Pictures," appeared in 1839. He died in Berlin, Jan. 3, 1880.

Kossovo, the "Field of Blackbirds," a plain in Turkey, near the Servian frontier, W. of the Prishtina, on which two battles were fought: (1) between Sultan Murad I. and the Servians under their Tsar Lazar, June 15, 1389; both sovereigns fell, and the Servians lost their independence in consequence of their defeat; (2) between the great Hungarian general Hunyady and Sultan Murad II., on Oct. 17–19, 1448, when the former was defeated.

Kossuth, Louis, the leader of the Hungarian revolution; born in Monok in Hungary in 1802. His family was of noble rank, but his parents were poor. He studied law at the Protestant college of Sarospatak, and practised for a time. In 1832 he commenced his political career at the diet of Presburg as the deputy of absent magnates, and as editor of a journal which, owing to the state of the law, was not printed, but transcribed and circulated. The subsequent publication of a lithographed paper led, in May, 1837, to Kossuth's imprisonment. He was liberated in 1840, and became the editor of the "Pesti Hirlap," a newspaper in the modern sense of the word, in which he advocated views too extreme for many of the liberals among the nobles, but which took strong hold of the youth of the country. In 1847 he was sent by the county of Pest as deputy to the diet, and soon became the leader of the opposition. He advocated the emancipation of the peasants, the abolition of all feudal rights and privileges, the freedom of the press, etc., and, after the French revolution of 1848, openly demanded an independent government for Hungary and constitutional government in the Austrian hereditary territories. To his speeches must in great part be ascribed not only the Hungarian revolution, but the insurrection in Vienna in March, 1848. On the resignation of the ministry in September, 1848, he found himself at the head of the Committee of National Defense, and prosecuted with extraordinary energy the measures necessary for carrying on the war. As a reply to an imperial decree, dated March 4, abolishing the Hungarian constitution, he induced the National Assembly at Debreczin, in April, 1849, to declare that the Hapsburg dynasty had forfeited the throne.

He was now appointed provisional governor of Hungary; but being disappointed in his hopes for the intervention of the Western Powers, and finding the national cause jeopardized by the interference of Russia, he endeavored to arouse the people to a more desperate effort. The attempt was vain. Finding that the dissensions between himself and Gögei were damaging the national cause, he resigned his dictatorship in favor of the latter. After the defeat at Temesvar on Aug. 9, 1849, he found himself compelled to flee into Turkey, where he was made a prisoner; but, though his extradition was demanded both by Austria and Russia, the Porte resisted their claims. In September, 1851, he was liberated by the influence of England and the United States, and, the republican government of France refusing him a passage through their territory, he sailed in an American frigate to England, where he was received with every demonstration of

public respect and sympathy. In December of the same year he landed in the United States, where he met with a most enthusiastic reception.

He returned in June, 1852, to England, and there he chiefly resided till Sardinia and France prepared for war with Austria; when, on condition of something definite being done for Hungarian independence, he proposed to Napoleon to arrange a Hungarian rising against Austria. He secured England's neutrality in the event of the war extending to Hungary. The peace of Villafranca bitterly disappointed Kossuth, but did not dishearten him. He made two other attempts (in 1860–1861, in conjunction with Cavour and with the help of Napoleon; in 1866, with the aid of Victor Emmanuel) to bring about a rising against Austrian rule in his native country, but without final success. When in 1867 Deák effected the reconciliation of Hungary with the dynasty, and initiated a *modus vivendi* between the two parts of the Austro-Hungarian monarchy, Kossuth retired from active political life. He afterward lived mostly in Turin, and, though never tired of denouncing the political and economical alliance between Hungary and Austria, abstained from conspiring or agitating against it; but he refused to avail himself of the general amnesty (1867) and to return to his native land to take the oath of fealty to the dynasty he had once dethroned. In 1880–1882 he published three volumes of "Memories of My Exile"; others followed in 1890. In virtue of an act passed in 1879 he lost his Hungarian citizenship early in 1890, he having resided abroad for 10 years after the passing of the said act without taking the prescribed steps. He died in Turin, March 21, 1894.

Kostomarov, Nikolai Ivanovich (kostō′mä-rōv), a Russian historian; born in Ostrogosz in 1817. His efforts while instructor at the University of Kharkov to promote the development of Little Russian as a separate tongue led to his arrest and temporary banishment. In 1859 he was restored to favor and appointed to a professorship in the University of St. Petersburg, but resigned in 1861. A brilliant poetical style characterizes his numerous literary and historical works, the best known being: "The Cossack War with Poland" (1856); "The Commerce of Moscow in the Sixteenth and Seventeenth Centuries" (1858); "Ancient Memorials of Russian Literature" (1861–1862); "History of the Polish Republic" (1870); "Russian History in Biographies" (1873–1876); "Mazeppa" (1882), a tragedy. Under the pseudonym "Jeremija Halka" he wrote several historical novels, besides dramas and ballads. He died April 19, 1885.

Kostroma, a government of Russia, surrounded by Vologda, Jaroslav, Vladimir, Nijnei-Novgorod, and Viatka; area, 32,700 square miles. The surface mostly consists of wide level plains, occasionally varied by gentle acclivities. The soil in the N. is cold and swampy, and in the S. consists of clay, loam, and sand, only of moderate fertility. Over 60 per cent. of the surface consists of forest. The most important crops are rye, wheat, hemp, and flax. The spinning and weaving of cotton and linen goods is carried on to a considerable extent. Tar, pitch, and potash are manufactured. Pop. (1897) 1,529,228.

Kostroma, a town in Russia, capital of the government of the same name, on a height near the confluence of the Kostroma with the Volga. It is an ancient place, surrounded by an earthen rampart which has been formed into a promenade and has numerous churches (including a cathedral), government buildings, an ecclesiastical college, and a gymnasium. It has manufactures of linens and cottons, Russia leather, etc., and an important trade in corn and timber. Pop. (1897) 41,268.

Kotah, the chief town of a native State of the same name in Rajputana, standing on the right bank of the Chambal; is a hot, unhealthy town, with a population of about 50,000. The area of the State is 3,797 square miles; pop. (1901) 544,350.

Köthen, a town in the German duchy of Anhalt, down to 1853 capital of the principality of Anhalt-Köthen; by rail 22 miles N. from Halle and 31 miles S. S. E. from Magdeburg. The castle of the former dukes (the line became extinct in 1847) was rebuilt in 1597–1606 after a fire. In the Cathedral of St. James there are some antique glass windows. The industries embrace iron foundries, sugar factories, etc. Pop. (1905) 22,978.

Kotliarevsky, Ivan Petrovitch (kotlē-ä-ref′skē), a Russian poet; born in Poltava, Sept. 9, 1769. He was the founder of modern Little Russian literature, his works being written in that language. They were and are very popular in Russia; his operettas "Natalka Poltavka" (1819) and "The Soldier Wizard" still holding the stage there. In his chief work, a satire on the state of Russian society, in the form of a burlesque on Vergil's "Æneid" (3 vols. 1798), was made the first literary use of genuine Little Russian. He died in Poltava, Nov. 10, 1838.

Koto, a musical instrument used by the Japanese. It is about six feet long, and in shape is an oblong box, larger at one end than the other, and with a convex top over which 13 silk strings are strung and fastened tightly at each end. To tune the instrument it is necessary to move the small bridges, one of which is placed under each string, to various positions.

Kotow, the ceremony of prostration, with striking of the forehead on the ground nine times, performed before the Emperor of China. The British envoy, Lord Amherst, in 1816, refused to perform the degrading ceremony, and the point was finally conceded by the Chinese in the treaty of 1857. Kotowing is unknown outside of China.

Kotzebue, August Friedrich Ferdinand von (kot'ze-bö), a German dramatist; born in Weimar, May 3, 1761. Weak in character-drawing, he had a strong sense for situations, and his works have been a mine for dramatists since. Of about 200 tragedies, comedies, dramas, and farces, many of them very popular at the time of their production, the best known now are: "Misanthropy and Repentance" (1789), reproduced in Paris as late as 1862, and famous in the United States and England in Sheridan's adaptation entitled "The Stranger"; and "The Spaniards in Peru" (1796), adapted by Sheridan as "Pizarro." "The Indians in England" (1790) won great applause. "German Provincials" was one of his best comedies. These excelled his tragedies, but were not delicate in expedients for raising a laugh at any cost. His most celebrated novel was "Sorrows of the Ortenberg Family" (1785). The famous "Doctor Bahrdt with the Iron Brow" (1790), published under another's name, contained an attack on Goethe, Schiller, etc., who declined to admit him to their society. He was very fond of publishing his autobiography. During much of his life he was in Russian service; and was once banished to Siberia by the Emperor Paul, who, however, recalled him a year later through being moved by something in one of his plays, gave him a rich estate, and made him aulic councilor and director of the court theater at St. Petersburg. He was assassinated in Germany as a Russian spy, by a student, in Mannheim, March 23, 1819.

A. VON KOTZEBUE.

Kotzebue, Otto von, a German explorer; born in Revel, Dec. 30, 1787; son of the preceding. He accompanied Krusenstern round the world in 1803–1806, and afterward made two long voyages of exploration in the Pacific, discovering among others the Krusenstern Islands, Kotzebue Sound, and the Suwaroff Islands during his first voyage (1815–1817); during the second expedition (1823–1826) he visited the Samoa group, the Philippines, the Sandwich Islands, etc. He died in Revel, Feb. 15, 1846. His two books, descriptive of his voyages, were both translated into English (1821 and 1830).

Koumiss (kö'mis), a fermented beverage made from mare's milk in the steppes of Russia by the Kirgheez, Tartars, Kalmuks, etc. The alcohol is derived from the milk sugar, which is present in mare's milk in larger quantity than in the milk of other animals. This fresh milk is diluted with water and placed in a sack of goat skin or the skin from the entire hind quarter of a horse, the wider end serving for base and the leg portion for the neck. There is generally added some yeast, the sediment from a previous brewing, to induce fermentation. In from 12 to 24 hours fermentation is complete, the product being known as "young koumiss," or saumal. Fresh milk is added daily, and as the product is concentrated by evaporation of water from the surface of the hide the old koumiss is much stronger than the new. Koumiss is an acid liquid of a not unpleasant pungent taste and an ethereal bouquet. It effervesces when poured into a glass. It is very intoxicating to persons not accustomed to its use, and produces drowsiness. Besides alcohol and carbonic acid, it contains the other constituents of the milk except the sugar, and is consequently very nourishing. It is easily assimilated, even by invalids, and the hardy vigor of the Tartars is attributed to its general use among them. Koumiss has in late years attracted attention among physicians, and its manufacture has become established in New York, Moscow, St. Petersburg, Vienna, Paris, and London. It may be made from the milk of any animal. It is claimed that koumiss is most valuable for the treatment of extreme debility, and it is said to have specific action in diabetes.

Kovalevsky, Alexander (kōv-ä-lev'skē), a Russian embryologist; born Nov. 19, 1840; became professor at Odessa; is specially known for his researches on the embryology of invertebrates, by which he gathered the material for Haeckel's Gastræa theory; for his discovery of the life history and true position of the ascidians; and for investigations of the development of the amphioxus, balanoglossus, sagitta, and brachiopods.

Kovalevsky, Sonya, a Russian mathematician; born in Moscow in 1850. Her father was an army officer. At 18 she married the palæontologist Kovalevsky in order to gain freedom for travel and study. After many academic triumphs she became Professor of Mathematics at the University at Stockholm. See her "Recollections of Childhood," with a biography by the Duch-

ess of Cajanello (Anne Charlotte Leffler-Edgren). Her works include theses on "Rotation"; "The Laplace Hypothesis"; "Light"; etc. She also wrote some popular novels under the pseudonym "Tanya Rerevski"; among them "Private Tutor," "The Rajevski Sisters," etc. She died in Stockholm in 1891.

Kovaree. See NIGER.

Koxinga (kō-shing'ä), a Chinese pirate who flourished in the 17th century. He made himself King of Formosa and terrorized the Chinese coast. He was finally killed in a sea fight.

Kra, or **Krao,** the isthmus connecting Siam with the Malay Peninsula, whose minimum breadth is 44 miles. Various projects have been mooted for the construction of a ship canal through this part of the isthmus. A canal here would shorten the journey from Ceylon to Hong Kong by 300 miles, and that from Calcutta to Hong Kong by 540 miles.

Kraal, a South African native village or town, usually a collection of huts surrounded by a palisade. Sometimes the term is applied to a single hut.

Krain. See CARNIOLA.

Krakatoa (krä-kä-tō'ä), a volcanic island in the Strait of Sunda, between Java and Sumatra; was in 1883 the scene of one of the most tremendous volcanic disturbances on record. The crater walls fell in, together with a part of the ocean bed, carrying with it two-thirds of the island (total area before the eruption 13 square miles), and creating two small islands, which subsequently disappeared. At the same time a gigantic ocean wave inundated the adjoining coasts of Java and Sumatra, causing a loss of 36,500 lives and the destruction of 300 villages, and then careered round the entire globe. The noise of the eruption was heard for a distance of 2,000 and even 3,000 miles. The occurrence likewise set up a series of concentric atmospheric waves, which traveled at least three times round the earth. The dust and other finely-comminuted debris cast up by the explosion gave rise during three years or more to weird sun-glows of wondrous beauty, those seen in Great Britain in November, 1883, being especially grand.

Kraken (krä'ken), a fabulous animal, first described by the Norwegian bishop Pontoppidan in 1750, and from time to time said to have been seen in the Norwegian seas. Its back is described as about a mile and a half in circumference; it rises from the sea like an island, stretches out mast-like arms, capable of dragging down the largest ships, and when it sinks again into the deep causes a whirlpool in which large vessels are involved to their destruction. It makes the waters round it thick and turbid, and is thus able to devour the shoals of fish that swim to the place attracted by the musky scent. This fact, together with numerous arms, point to one or other of the large class of cuttle fishes as the true original of the Scandinavian kraken. The fable of the kraken has considerable analogy to the more recent stories of the great sea serpent.

Krakow. See CRACOW.

Kranach, Lucas. See CRANACH.

Krantz, Albert (kränts), a German historian; born in Hamburg about 1450. He became rector of the University of Rostock in 1482, represented the Hanseatic towns in several important diplomatic missions, and was chosen arbitrator by the King of Denmark and the Duke of Holstein in their dispute over the province of Ditmarsch. His historical works are distinguished by great erudition, and a critical spirit rarely found in his day. He published: "Vandalia, or the History of the Vandals" (1519); "Saxonia" (1520); "Chronicles of the Kingdoms of Sweden, Denmark, and Norway" (1545); "Metropolis, or History of the Church in Saxony" (1548). He died in Hamburg, Dec. 7, 1517.

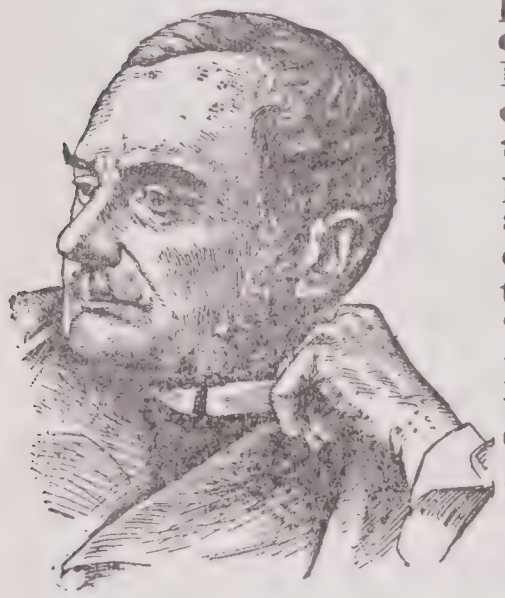
Krantz, Jean Baptiste Sebastien, a French engineer; born in 1817. He built the Trocadero and other French exposition buildings. He wrote "Reservoir Walls" and books on public works.

Krapotkin, Peter Alexievich, Prince, a Russian scientist; born in Moscow, Dec. 9, 1842. He was in the Russian army for a time and made extensive journeys in Siberia and Manchuria. Charged with anarchist affiliations, he was imprisoned two years in Russia, escaped, founded the anarchist paper "La Révolte" in Geneva (1879), and after being expelled from Switzerland in 1881, commenced a crusade against the Russian government in the English and French press. He was imprisoned in France from 1883 to 1886, under a law directed against the International Workingmen's Association, of which he was a member. He lectured in various parts of the world; is the author of "To Young People"; "Words of a Revolutionist"; "In Russian and French Prisons"; "In Search of Bread"; and pamphlets on nihilistic subjects; and his contributions on modern scientific subjects to the leading reviews were numerous and interesting.

Krasicki, Ignacy (krä-sitz'kē), a Polish ecclesiastic; born in Dubiecko, Galicia, in 1734. He became Bishop of Ermeland in 1767, Archbishop of Gnesen in 1795, and for many years was one of the most brilliant figures at the court of Frederick II. The characteristics of his productions

are caustic wit and a facile and agreeable style, which procured for him the title of "the Polish Voltaire." "Monachomachia, or the Battle of Monks," is considered his best work, but his "Satires" (1778) and "Fables" (1780) also take a high rank. He died in Berlin, March 14, 1801.

Krasinski, Sigismund, (krä-sin'skē), a Polish poet; born in Paris, France, Feb. 19, 1812. On account of his health he lived in various European capitals outside Poland. He became one of Poland's three greatest poets, exerting a wide influence on her literature. The drama "Iridion," depicting the contrast between Christianity and paganism in Rome under the Cæsars, appeared in 1836, and is generally thought his finest work. Next best are the symbolic drama "Nieboska Comedya" (The Undivine Comedy: 1837–1848); "Przedswit" (The Dawn: 1843); and "Psalmy Przyszlosci" (Psalms of the Future: 1845–1848), collections of lyric poems full of religion and patriotism. His writings were all published anonymously or under fictitious names. He died in Paris, Feb. 23, 1859.



SIGISMUND KRASINSKI.

Krasinski, Valerian, a Polish patriot; born about 1780. He was a scion of an illustrious Polish family that had early adopted the Protestant faith. Being possessed of great natural abilities, which were improved and matured by a thorough education, he was appointed one of the chief officials in the bureau of public instruction for Poland. He strenuously exerted himself to promote education among the various classes of dissenters, and, with a view to this, introduced, at great expense to himself, the process of stereotyping. When the Poles rebelled in 1830, and set up an independent government, Krasinski was sent as their representative to London, where, from 1831, he remained as an exile for 20 years, and then removed to Edinburgh, where he died Dec. 22, 1855.

Krasnovodsk, a Russian fortress on the E. shore of the Caspian Sea. It has been the starting point of many important scientific and military expeditions to Central Asia.

Kraszevsky, Jósef Ignacy (kra-shĕv'-skē), a Polish novelist; born in Warsaw, July 28, 1812. He was the author of over 500 works, consisting, besides valuable historical writings, of romances, novels, critiques, travels, political treatises, epic poems, etc. Of poetry, among his chief works was the epic "Anafielas" (1840–1843), in three parts, founded on Lithuanian history. "The Devil and the Woman" (1841) was an imaginative drama. But his best work was in his romances and novels, over 240 in number. Among them were: "The Poet and the World" (1839); "Ulana" (1841), containing pictures of Polish society; "The Hut Beyond the Village" (1855), which became very popular in his country; "About to Die" (1871). He died in Geneva, March 19, 1887.

Krause, Karl Christian Friedrich (krous'uh), a German philosopher; born in Eisenberg, Saxe-Altenburg, May 6, 1781. For two years he was tutor at the University of Jena, and then traveled about Germany, France, and Italy. Besides treatises on music, language, and philosophy, he published several works on Freemasonry which best represent his peculiar philosophic ideas. Chief among them are: "Observations on the History of Freemasonry" (1810); "The Three Oldest Monuments of Freemasonry" (1810); "Prototype of Mankind" (1811). He died in Munich, Sept. 27, 1832.

Krauskopf, Joseph, an American clergyman; born in Ostrov, Prussia, Jan. 21, 1858. He came to the United States in 1872; was graduated at the University of Cincinnati in 1883; made rabbi by Hebrew Union College; and in 1887 became rabbi of Reform Congregation Keneseth Israel in Philadelphia. He became a leader in the reformed Jewish movement, and published "Evolution and Judaism," and many volumes of lectures.

Krehbiel, Henry Edward, an American musical critic; born in Ann Arbor, Mich., March 10, 1854. He was musical critic successively on the Cincinnati "Gazette" and the New York "Tribune." His published works include: "The Technics of Violin Playing," "How to Listen to Music," etc.

Krefeld (krā'feldt), one of the important manufacturing towns of Germany; 12 miles N. W. of Düsseldorf. It owes its importance to the settlement here, in the 17th and 18th centuries, of refugees from Juliers and Berg, and the neighboring countries, compelled to leave their homes by religious persecution; they established the silk and velvet manufactures for which Krefeld is now noted. Pop. (1905) 110,344.

Kreittonite, a mineral belonging to the group of zinc-spinels, or gahnite, in which part of the alumina is replaced by sesquioxide of iron. Hardness, 7–8; sp. gr. 4.48–4.89. Occurs in greenish-black crystals and granular massive, associated with pyrrho-

tite, etc., at Bodenmais, Bavaria.. Originally named spinellus superior by Breithaupt.

Kremenchug, a town of Russia, on the Dnieper, 74 miles by rail S. W. of Pultowa. From 1765 to 1789 it was the chief town of New Russia; it is now the seat of great industrial activity; especially in wool, timber, and tobacco, and of factories for agricultural machines, leather, tobacco, candles, etc. Pop. (1897) 58,648.

Kremer, Alfred von (krā′mer), an Austrian diplomatist; born in Vienna, May 13, 1828. On his return from a visit to Syria and Egypt he was made Professor of Modern Arabic in the Polytechnic School, Vienna; and after 1858 held important positions in the consular service at Cairo, Galatz, and Beyrout. He published (1875–1877) "A History of Oriental Civilization Under the Khalifs," which has firmly established his reputation as an Orientalist. Other important works are: "Egypt" (1863); "Legends of Southern Arabia" (1866); "History of the Dominant Ideas of Islam" (1868); "The Idea of Nationality and the State" (1885). He died in Vienna, Jan. 1, 1890.

Kremersite, an isometric mineral, occurring in octahedrons, as a sublimation product, in the fumaroles of Vesuvius. Color, ruby-red; soluble in water. Composition (according to Kremers), a hydrated chloride of potassium, ammonium, and iron.

Kremlin, The, an architectural pile in Moscow, on the N. bank of the river Moskva. It forms the center of the city of Moscow, and around it, with a radius of about a mile, is a line of boulevards, extending, however, only on the N. side of the river. Outside of this line, and concentric with it, is another line of boulevards, with a radius of a mile and a half; while beyond all, and forming the girdle of the city, is the outer rampart, with a circumference of 26 English miles. The Kremlin comprises the principal buildings, as the Cathedral of the Assumption of the Virgin, founded in 1326, a small but gorgeously decorated edifice; the Cathedral of the Archangel Michael, containing the tombs of all the czars down to the time of Peter the Great, who changed the royal burial place to St. Petersburg; the Church of the Annunciation, the floor of which is paved with jaspers, agates, and carnelians of various shapes; the tower of Ivan Veliki, 200 feet in height, and surmounted by a magnificent gilded dome from which, as from all the domes of Moscow, rises the "honorable cross"; the Czar Kolokol (king of bells), the greatest bell in the world, several palaces and collections of ancient arms and other antiquities; the arsenal, surrounded by the splendid trophy of 850 cannons, taken from the French, and the senate. The walls of the Kremlin are surmounted by 18 towers, and pierced with five gates.

Kremnitz, one of the oldest towns of Hungary, in the county of Bars, in a deep, gloomy valley. It is famous for its gold and silver mines, which, however, are less productive now than formerly, and its mint. Pop. (1890) 9,179.

Kremnitz, Mite (Marie), a German writer; born in Greifswald, Jan. 4, 1852. Of her works on Rumania may be named: "Rumanian Sketches" (1877); "New Rumanian Sketches" (1881); Rumanian Tales" (1882). Prominent among her other books are: "Exiles" (1890), a romance; "Love's Curse" (1881), written under the pseudonym "George Allan"; "A Prince's Child" (1882). In collaboration with "Carmen Sylva" she has written: "Anne Boleyn," "From Two Worlds," "Astra," "Revenge," "Astray."

Kretzer, Max, a German novelist; born in Posen, May 7, 1854. He was a powerful realist. Several of his works were on Socialism. Among the best of his writings are: "Berlin Tales and Pictures of Manners," "Civil Death," a drama; "The Deceived," "The Sermon on the Mount," dealing with social questions; "The Creator of Millions" (1891); "Uncle Fifi," "The Two Confederates," dealing with social questions, and "Strange Enthusiasts."

Kreuzer, a small copper coin still in use in Austria, 100 making a florin or gulden (nominal value, 48 cents). Till 1876 it was current also in Southern Germany as the 60th part of a gulden. The kreuzer was first coined in the 13th century in Tyrol, was originally of silver, and derived its name from the cross (*kreuz*) formerly conspicuous on it.

Kreuznach (kroits′na*h*), a town of Rhenish Prussia, dating from the 9th century, on the Nahe. Its chief manufacture is champagne, its principal trade in wine and corn; but it is most notable for its salt springs. These were discovered in 1478, and, being serviceable in scrofulous and other affections, attract over 5,000 visitors annually. Pop. (1900) 21,321.

Kriegspiel, (krēg′spēl), a German game in which by means of leaden pieces representing various sized bodies of men, moved by two officers acting as generals, under certain rules, on a map exhibiting all the natural features of a country, the art of war is exemplified and set forth.

Kriemhild, the heroine in the "Nibelungenlied"; daughter of King Gibich, sister of the princes Gunther, Gernot, and Giselher, and wife of Siegfried; subsequently as wife of King Etzel she caused the death of her brothers for having killed her first husband.

Kriloff. See KRYLOV.

Kris, a dagger or poniard, the universal weapon of the inhabitants of the Malayan Archipelago. It is made of many different forms, short or long, straight or crooked. The hilt and scabbard are often much ornamented. Men of all ranks wear this weapon, and those of high rank when in full dress sometimes carry three or four. In Java women sometimes wear it.

Krishna, the 8th avatar (incarnation) of Vishnu. Kansa, a demon king of Mathura, having ruled oppressively, the Brahmans supplicated Vishnu to interfere. He, in reply, plucked off two hairs, one black, the other white; the former became Krishna. He was born at Mathura; his father was Vasudeva, a kshatriya (warrior), and his mother Devaki. Kansa seeking to destroy him when an infant, his father fled away with him, and hid him in a vaisya's (merchant's) shop. When eight years old it rained heavily, and the god rooted up a mountain, and obligingly held it as an umbrella over the heads of the villagers and their cattle. When a youth he sported with 16,000 milkmaids in the wilderness of Bindrabun. Next assuming four arms, he killed the tyrant Kansa. He married two wives, but his favorite was a mistress called Radha. According to Ward, about three-fifths of the whole Hindu population of Bengal are worshipers of this god, and various festivals are held in his honor. He is also worshiped in other parts of India. He is generally represented as a black man, holding a flute to his mouth with both hands, sometimes with his favorite Radha standing on the left. He may have been a historical personage, around whom multitudinous myths have gathered.

Kriss Kringle, a sort of St. Nicholas. On Christmas eve, Kriss Kringle, arrayed in a fur cap and strange apparel, goes to the bedroom of all good children, where he finds a stocking or sock hung up in expectation of his visit, in which depository he leaves a present for the young wearer. The word means Christ-child, and the eve is called Kriss Kringle eve. See ST. NICHOLAS.

Krodo, the Saturn of the ancient Saxons.

Kroeger, Adolph Ernst, an American writer; born in Schwabstedt, Schleswig, in 1837. During the Civil War he served on Frémont's staff. By translations of the works of Fichte, Kant, and Leibnitz he largely contributed to a better understanding of German literature in the United States. He wrote for the St. Louis "Journal of Speculative Philosophy." He published Fichte's "Science of Knowledge" (1868); the same author's "Science of Rights" (1869). He also issued "Our Forms of Government, and the Problems of the Future" (1862). He died in St. Louis, Mo., 1882.

Kroeh, Charles Frederick (krō), an American educator; born in Germany in 1846. After 1871 he was Professor of Languages at Stevens Institute of Technology. He wrote "How to Think in German," and other language text books.

Kronstadt, an important trading and iron manufacturing town, capital of a Hungarian county in the extreme S. E. of Transylvania. Pop. (1901) est. 35,000. For the Russian Kronstadt, see CRONSTADT.

Kroo, or Kru, a native race of Africa, much employed in doing rough work on vessels trading on the Liberia coast. Their territory extends about 70 miles along the W. coast; they are a stout, brawny race, and very industrious.

Kropotkine. See KRAPOTKIN.

Krüdener, Barbara Juliane von, Baroness (krü'de-ner), a Russian novelist; born in Riga, Nov. 21, 1764. Her checkered and romantic career touched the extremes of life — worldliness and sainthood. After having left her husband, with whom her union had been unhappy, and tasted Parisian dissipation, she became a Swedenborgian, and devoted herself to helping the poor and afflicted. Surrounded by a retinue of clergy, she traversed Europe, preaching eloquently to the people a return to primitive Christianity, and being persecuted and expelled by the different governments. She was the friend of Queen Louise of Prussia and of Alexander I. of Russia, and is said to have been very influential in the formation of the Holy Alliance. She foretold Napoleon's triumphant return from Elba. Her death was the result of ascetic practises. Her literary reputation rests upon the famous romance "Valéria, or Letters of Gustave de Linar to Ernest de G——." She died in Karassu-Bazar, Dec. 24, 1824.

Krüger, Johann Christian (krüg'er), a German dramatist; born in Berlin in 1722. He studied philology, but became an actor and a playwright. Among his comedies were: "The Clergy in the Country," "The Blind Husband," "The Candidates, or the Way to Get in Office," "The Wedded Philosopher," "The Devil's a Coward," and the universally popular "Duke Michael." He died in Hamburg, Aug. 23, 1750.

Kruger, Stephanus Johannes Paulus, a Boer statesman; born near Colesberg, Cape Colony, Oct. 10, 1825. He entered on the more active portion of his public career when he was chosen a member of the Executive Council of the Transvaal in 1872, President Burgess being then at the head of affairs. Ten years later he was elected

president for the first time. In 1883 he was reëlected for five years, and in 1888, after a contest with General Joubert, he was again chosen president, being reëlected in 1893 and 1898. On the breaking out of dissensions between the Uitlanders and the Boers in 1896, and the raid of Dr. Jameson in aid of the former, vigorous measures were adopted by President Kruger, resulting in the capture of Jameson and his 700 men and the suppression of the rebellion. For this the president received the congratulations of the German emperor. In 1899 his policy led to war with England. The Boer reverses led to his departure for Europe, where he established himself in Holland. In the summer of 1901 he proposed visiting the United States for the purpose of inducing the government to give its

STEPHANUS J. P. KRUGER.

moral support to the Boers, but on being informed that the President would not receive him, excepting in a strictly unofficial manner, the project was abandoned. He died July 14, 1904.

Krummacher, Friedrich Wilhelm (kröm'äh-er), a German theologian; born in Mörs-on-Rhine in 1796. Some of his religious writings, particularly on the history of "Solomon" and "Elijah the Tishbite," have acquired a great popularity not only in Germany, but, by means of translations, in Great Britain and the United States. In 1843 he was called to a German Reformed congregation in New York, but accepted instead of it a call to Bremen in 1847; subsequently he was chaplain to the Prussian court at Potsdam. He died Dec. 10, 1868.

Krummhorn, the name of a very old wind instrument made of wood, the under part of which is bent outward in a circular arc. Krummhorn is also the name of an organ stop found in almost all German organs and generally of eight-foot pitch. The pipes are made of tin, the body or sounding part being cylindrical and partly shut at the upper end. The Italian name of *cromorne* has been corrupted by English organ builders into cremona, which is the same stop in English organs. The sound of the krummhorn as an organ stop is soft and quiet, but it is defective in not keeping in tune so well as other reed stops.

Krupp, Alfred, a German metal founder and steel gun manufacturer; born in Essen, Prussia, in 1812. His father founded the manufactory. The manufactory had grown to large proportions before the elder Krupp's son, Alfred, made the discovery that put his establishment ahead of all similar concerns. He discovered the method of casting steel in very large masses. In 1851 he sent to the London Exhibition a block of steel weighing 4,500 pounds, and was able to cast steel in one mass weighing more than 100,000 pounds. He manufactured a great variety of articles for use in various peaceful industries, but his world-wide fame was made by the production of the enormous steel siege guns with which the Germans did such terrible execution when they invested Paris. Krupp made his first cannon in 1846. Krupp gave regular employment in his iron mines, factories, and foundries to many thousand men. In 1864 he declined to accept the letters of nobility offered to him by the King of Prussia. He was one of the wealthiest men in Germany and did much for the welfare of his numerous employes. Some of Krupp's processes in the manufacture of steel and the making of cannon were very carefully kept from the knowledge of the outside world. None but employees were admitted to his foundries. The commission appointed by the United States government to study the question of cannon foundries and armaments tried in vain to get Krupp's permission to enter his works. He died July 14, 1887.

Krupp Steel, a name for one of the most important products of the Essen works in Prussia. Puddled steel, though useful for most purposes in the arts (except cutlery), nevertheless wants homogeneity, on account of a certain intermixture of cinder which is difficult to get rid of without fusion — a defect which is apt to prevent it from welding perfectly. In Krupp's works the puddled steel is remelted into crucibles, in order to convert it into cast steel; and it is the uniformity of quality with which he manufactures this in large masses that constitutes the superiority of his productions. The crucibles employed are made with extreme care, mainly from fire clay, to which a little plumbago is added; their capacity varies from 50 to 100 pounds, and it is reported that as many as 100,000 are kept drying at the same time. After being once used the crucibles are broken up and mixed with other

material to make new ones. In the casting house where the large ingots are run the furnaces, which contain about 1,200 crucibles, are arranged along the sides of the building; and in the central portion the steel molds, varying in capacity from 100 pounds to 50 tons, are disposed in line between two pairs of rails, upon which runs a movable crane. In casting an ingot of 50 tons of steel from crucibles of small capacity, the organization of Krupp's establishment becomes apparent. At a given signal one gang of workmen remove the crucibles from the furnaces while another seize them with tongs for the purpose, and pour their contents into narrow canals of wrought iron, lined with fire clay, which converge into the opening by which the mold is filled. This is the critical stage of the operation, the difficulty being to deposit in the mold a continuous stream of melted steel of about the same degree of heat, so as to cool uniformly, and to solidify into a perfectly homogeneous mass. In order to manipulate these masses of steel there is a steam hammer weighing 50 tons — the mechanical marvel of the works at Essen — which has a cylinder nearly six feet in diameter. It has a 50-ton crane at each of its four corners, and behind each of these again there are four heating furnaces. A movable bench on low massive wheels serves to remove a large ingot from any of the furnaces, which is then, by means of the powerful cranes and a system of pulleys and crabs, placed on the anvil, and worked into any desired shape. The anvil face weighs 185 tons. The steel manufactured by Krupp consists chiefly of rails, tires, crank axles, shafts, mining pump rods, and guns — the proportion of ordnance being about two-fifths of the whole. Kruppized armor-plates made at this establishment are said to be the best armor in the world. In 1898 the United States made exhaustive tests of some of these supercarbonized steel plates, with satisfactory results.

Krusenstern, Adam John, Baron von, a Russian voyager; born in Haggud, Esthonia, Nov. 8, 1770. After serving for some time in the British navy he was commissioned by Alexander I. of Russia to command a naval expedition for exploring purposes in the North Pacific. In the course of a three years' voyage (1803–1806), the first made round the world by a Russian navigator, he discovered the Orloff Islands, and explored the Marquesas and Washington groups, the W. coast of Yezo, the coast of Saghalien, and the Northern Kurile Islands. But he failed in the second object for which he was sent out — the opening of Russian trade with Japan. He published an account of his voyage, which was soon translated into the principal languages of Europe, and to this he subsequently added "Contributions to the Hydrography of the Pacific Ocean" (1819), "Atlas of the Pacific Ocean," and other works on the same subject. He died in Esthonia, Aug. 12, 1846.

Krusman, the Hercules of the ancient inhabitants of the Rhine.

Krylov, Ivan Andréevitch (krē-lof'), a Russian writer of fables; born in Moscow, Feb. 13, 1768. He is the most popular author in Russia; the children learn to read from his books, and many of his verses have become national proverbs. His statue stands in the summer garden at St. Petersburg. He produced 142 fables original in substance and form, and 56 translations or imitations. Without ill-nature, their satire on existing conditions is keen. They are written in verse, simple and attractive in style; any child or peasant readily understands them. They have been translated into every European language. He died in St. Petersburg, Nov. 21, 1844.

Krypton. See CRYPTON.

Kshatriya (ksat'rē-yä), a designation of the second of the four great Hindu castes, ranking immediately beneath the Brahmans and above the Vaisyas (merchants). It is the military caste. It is doubtful if it maintains its distinctness. Perhaps no Hindu can definitely prove himself of Kshatriya descent. The Rajpoots, the Mahratta aristocracy, etc., claim to be so, though the latter clearly originated from the fourth or laborer caste.

Ktistolatræ (ktis-ol'ä-trē), a branch of the Monophysites, which maintains that the body of Christ, before His resurrection, was corruptible.

Kuban, a Russian province in the Caucasus; area, 36,441 square miles; pop. (1897) 1,922,773. The chief river is the Kuban, which rises in Circassia at the foot of Mount Elbruz, flows first N., then N. W., and ultimately due W., and falls, after a total course of about 400 miles, into the Black Sea at the Bay of Kuban, near the Strait of Kertch.

Kubla Khan, the founder of the 20th Chinese dynasty, that of the Mongols or Yen. He was the grandson of Genghis Khan, and was proclaimed Emperor of the Mongols in 1260, in succession to his brother Mangou Khan. He reigned, at first, only in Mongolia and the countries conquered by Genghis Khan; but he invaded China in 1267; captured the Chinese emperor in 1279, and thus overthrew the Song dynasty, which had ruled for 319 years. He extended his conquests over Tibet, Pegu, Cochin China, and formed the greatest empire known in history, embracing the whole of Asia and part of Europe, from the Dnieper

to Japan. He patronized letters, and encouraged agriculture, industry, and commerce. Marco Polo passed 17 years at his court. He died in 1294.

Kubelik, Jan, a Bohemian violinist; born in 1879; began his career as a public performer in 1887, when he played before the Prague Philharmonic. For some time he performed at semi-private musicales, but in 1897 he was luckily heard by a well-known critic, who was impressed by his ability and arranged for his appearance at a public orchestral concert. His success was immediate, and thereafter he performed at the Teatro Lyrics in Milan, in Florence, at the San Carlo in Naples, at the Costanz in Rome, and in Genoa. Subsequently he made a brief but unusually successful tour on the Continent and in England, and in December, 1901, came to the United States, where he was enthusiastically received.

Kuch-Behar. See COOCH-BEHAR.

Kudumba. See CADAMBA.

Kudrun. See GUDRUM.

Kuen Lun (kwen-lun′), a mountain chain of Central Asia, which forms the N. wall of the Tibetan plateau, as the Himalayas do the S. Starting from the Pamir plateau, the Kuen Lun extends E. The entire region, which varies from 100 to 150 miles in width, is covered with snow, and in many places with gigantic glaciers. Between the chains lie narrow valleys of a very steep inclination. Storms of sand and of snow, often of both commingled, rage violently in winter. The peaks of this region measure from 18,000 to 25,000 feet in altitude, and the passes from 13,000 to 18,000 feet. These mountains were almost unknown till the explorations of the Russian General Prjevalski, 1876–1888.

Kufic Coins, the early Mohammedan coins engraved with inscriptions in the Kufic or epigraphic Arabic character, as distinguished from the Neskhi or cursive writing; but the term is often applied erroneously to Arabic coins in general.

Kugler, Franz Theodor (kög′ler), a German historian; born in Stettin, Jan. 19, 1808. He was appointed a Professor of Fine Arts in the University of Berlin in 1833, and subsequently became a member of the Academy of Berlin. His works have undoubtedly had great influence on German art and culture; notably a "History of Painting from Constantine the Great to the Present Times" (1837); "Handbook of the History of Art" (1841–1842); "History of Architecture" (1856). He is also the author of a "History of Frederick the Great" (1840), which is popular in Germany. He died in Berlin, March 18, 1858.

Kuh-horn, a musical instrument made of wood or bark with a cupped mouthpiece, formerly employed by the mountaineers of Switzerland and other countries to convey signals or alarms in war time, but now only used by cowherds — hence the name.

Kuhn (kön), **Adalbert,** a German philologist; born in 1812. He made important contributions to comparative philology, and is regarded as the founder of the science of comparative Indo-Germanic mythology. He died in 1881.

Kühne, Gustav (kü′nuh), a German novelist and poet; born in Magdeburg, Dec. 27, 1806. Among his novels were: "A Quarantine in the Madhouse"; "Feminine and Masculine Characters"; "Portraits and Silhouettes"; "Convent Tales"; "The Rebels of Ireland"; "German Men and Women"; "The Freemasons." Of poems, in addition to those contained in his collected works, he published: "Roman Sonnets"; "Christ on His Travels"; "Wittenberg and Rome"; "Romances, Legends, and Fables." He died in Dresden, April 22, 1888.

Kuka, or **Kukawa,** a town in Western Africa, the capital of Bornu, about 20 miles W. from the S. W. shores of Lake Tchad.

Ku-Klux Klan, a secret American organization which, said to have been founded in 1866 at Pulaski, Tenn., originally for purposes of amusement only, soon developed into an association of "regulators," and became notorious for the lawless deeds of violence performed in its name. The proceedings of the Ku-Klux in the Southern States are one feature of the determined struggle to withhold from the emancipated slaves the right of voting. The outrages and murders which convulsed the country in 1868–1869 ended in the calling out of troops and the formal disbandment of the society in March of the latter year; but its name and often its disguises were used for years to cover the violence of political desperadoes.

Kulanapan, a linguistic stock of North American Indians, also called Pomo and Mendocino Indians. They were once a powerful people and occupied a large section of Northwestern California, but now only a few scattered individuals survive.

Kulja (köl′yä), a town of Zungaria, Central Asia, on one of the great highways leading from China to West Turkestan, and on the Ili. This river rises on the N. slope of the Tian-Shan Mountains, and flows N. and N. W. into Lake Balkhash after a course of about 750 miles. Kulja is the chief town of a fertile district that produces excellent corn, rice, cotton, tobacco, wine, and fruits, while its pastures support large herds of horses, camels, cattle, and

sheep. This district (Kulja or Ili) revolted against China in 1865, was occupied by Russia in 1871, but 10 years later restored to the Chinese. Russia, however, retained 4,357 square miles of the W. part, now incorporated in the province of Semiryetchensk. The Chinese province has an area of 23,130 square miles and a population of 70,000. The town of Kulja has about 12,500, mostly Chinese inhabitants. New Kulja, 25 miles to the W., was destroyed by the rebels in 1866; previous to that date it had 75,000 inhabitants.

Kulm, a village of Bohemia. It was the scene of a bloody conflict between the French and the allied Prussians and Russians in 1813. The result was the complete wreck of the French army, which lost in two days little short of 20,000 men; Vandamme capitulated with 10,000 men.

Kulmann, Elisabeth Borisovna, a Russian poet; born in St. Petersburg in 1808. She was very precocious, and wrote in Russian, German, and Italian. Her Russian poems, edited by the Russian Academy, appeared in 1833; the best edition of her German verse is that of 1857; the Italian poems were published at Milan in 1847. Her poetry, written in a simple and clear style, showed keen observation, considerable descriptive power, and a lively imagination; Goethe prophesied for her an honorable place in literature. A monument was erected to her memory by the Russian empress. She died in 1825.

Kulturkampf (köl-tör'kämpf), a German term denoting the contest for political and legal ascendancy waged between the authorities of Prussia on the one hand and the authorities of the Vatican on the other.

Kum, next to Meshed the most sacred city of Persia, is a straggling, half ruined, uninviting town on the commercial road between Ispahan and Teheran; pop. about 20,000.

Kumara, the Hindu war god. One of the most celebrated Hindu poems is the legendary history of this god. R. T. H. Griffith has translated seven cantos of it into English verse.

Kumasi, the capital of the late kingdom of Ashanti, Western Africa. It occupies the side of a rocky hill, and is about 4 miles in circuit. The walls of the houses are mostly formed of stakes and wattle work, the interstices being filled up with clay; the roofs are of palm leaves. The king's palace was burned by Wolseley in 1874, but has been rebuilt. In 1901 the country was annexed by Great Britain and politically attached to the Gold Coast Colony. Pop. (1905) 5,940. See ASHANTI.

Kumbhakonam. See COMBACONUM.

Kumbuk, a large Indian tree. The bark is used for tanning black. It imparts the characteristic red color to native leather, and, if cut up into small pieces and boiled for six hours, gives a brown dye. Along with the bark of *Mimusops elengi* it is used to produce a red dye in jute. It affords a black one with iron. The wood is much used on account of its toughness for making shafts to gigs.

Kumquat, a tree about six feet high, of the orange genus, growing in China and Japan. There are groves of it in the island of Chusan. The fruit, which is oval, is about the size of a gooseberry. It has a sweet rind and an acid taste. The Chinese use it as a preserve.

Kundah Oil, an oil derived from *Carapa touloucouna,* or *guianensis.* It is acrid and bitter, and said to be well fitted for lamps. Called also tallicoonah oil.

Kunduz, a river and State of Afghan Turkestan.

Kunersdorf, a village in Prussia; 4 miles E. of Frankfort-on-the-Oder; was the scene of one of the most remarkable battles of the Seven Years' War, fought Aug. 12, 1759, in which Frederick the Great with 48,000 men, after gaining a half victory, was completely defeated by the allied Russians and Austrians, 78,000 men strong. The Prussian loss was 18,500 men, with almost all their artillery and baggage, while their opponents lost 16,000 men.

Kunkur, or **Kankar,** a calcareous stratum found in many parts of India. It is of comparatively modern age, but its precise geological date has not yet been determined.

Kunnoj (kun'oj), a formerly important town of British India, capital of the pergunnah of the same name, in the district of Furruckabad. At present the place is little more than an expanse of ruins, whole mountains of which meet the eye in every direction upon a space of ground much larger, it is said, than the site of London. Kunnoj was formerly one of the greatest Indian cities, and according to some ranks second in respect of antiquity.

Kunstmann, Friedrich (könst'män), a German historian; born in Nuremburg, Jan. 4, 1811. He was private tutor to the Princess Donna Amalia of Brazil in Lisbon (1841–1846), and on his return to Munich was appointed to a professorship in the university. He contributed papers to the transactions of the Munich Academy, and published: "The Latin Penitential Books of the Anglo-Saxons" (1844); "Africa before the Discoveries of the Portuguese" (1853); "The Discovery of America from the Most Ancient Sources" (1859), with

an atlas giving fac-simile copies of early maps. He died in Munich, Aug. 15, 1867.

Kunthia, a genus of palms, tribe *Arecæ*. The only special, *K. montana,* is a reed-like palm, 20 feet long, but only an inch thick, with a tuft of leaves at the top. It is found in New Granada, the Indians of which use the reedy stems as tubes through which to blow their poisoned arrows. The juice of the tree is used as a remedy for snake bites.

Kunz, George Frederick, an American gem expert; born in New York city, Sept. 29, 1856; was educated at Cooper Union, receiving an honorary A. M. at Columbia University. He became a special agent of the United States Geological Survey in 1883; was in charge of the department of mines at the Omaha, Atlanta, World's Columbian and Paris Expositions; was president of the New York Mineralogical Club and vice-president of the American Institute of Mining Engineers, etc. He contributed over 100 papers on gems, minerals, etc., to magazines and reviews, and is the author of "Gems and Precious Stones of North America"; annual reports on the "Production of Precious Stones," in "Mineral Resources of the United States," etc.

Kupfernickel. See COPPER-NICKEL.

Kupferschiefer (köp'fer-shēf'er), one of the series of strata which make up the "Dyas" type of the Permian System as it is developed in Germany. The bed consists of black bituminous shale, about two feet thick, abundantly charged with well-preserved remains of various fish, coniferous leaves, fruits, etc. The organic remains are abundantly coated and even replaced by copper ore (hence the name of the bed), which has been extensively worked along the flanks of the Harz.

Kur, or **Kura,** (ancient Cyrus or Kûros), a river of Western Asia, rising in the mountains W. of Kars, flowing through the Russian governments of Tiflis, Elizabethpol, and Baku, and falling into the Caspian Sea, after a course of between 500 and 600 miles. It has numerous tributaries, the principal of which is the Aras or Araxes.

Kuram (kö-ram'), a river rising in Afghanistan near the N. end of the W. Suliman range, and flowing through British territory into the Indus near Isakhel. Its valley affords a famous pass into Afghanistan.

Kurdistan (kur-dis-tän'), an extensive geographical, though not political, region of Asia, for the most part included within a line drawn from Sivas in Asia Minor by way of Diarbekr, Sulimanieh, Kermanshah and Urmia (in Persia), Mount Ararat, and Erzerûm, back to Sivas. Kurdistan thus belongs to both the Turkish and Persian monarchies, chiefly to the former, and contains about 50,000 square miles, with a population estimated at more than 2,250,000, thus distributed: Nearly 1,500,000 in Turkey, 700,000 in Persia, 45,000 in Russian Transcaucasia, and about 5,000 on the Afghano-Persian frontier (transplanted thither by Nadir Shah). The country embraces the mountainous chains that abut upon the Armenian plateau on the S. and on the Iranian plateau on the E. Thus its surface ranges from 5,000 up to 15,000 feet in altitude. Between the mountain chains, the summits of which are generally densely wooded, lie grassy plateaus. Numerous rivers force their way through the mountains at right angles to the directions of their main axes, and go to feed the Tigris and the Euphrates; chief of these tributaries are the two Zabs, the Batman-su, and the two branches of the Euphrates. The principal products of the soil and of native industry are wool, butter, sheep, gum, gall-nuts, hides, raisins, and tobacco.

The bulk of the inhabitants are Kurds (the ancient Carduchi), a race partly nomad and pastoral, and partly settled and agricultural. The Kurds, who speak a language called Kermanji, derived from an old Persian dialect, have from time immemorial stood on the same level of civilization. They are predatory and impatient of political subjection, but recognize a code of rude chivalrous honor and are hospitable and brave. They live under chiefs of their own, but are nominally subject to the Porte and the Shah of Persia respectively. Their origin is traced back to the Turanian Gutu or Kurdu, who were a powerful people in Assyrian times. After the fall of Nineveh they gradually became merged in the Medes and were Aryanized. Kurdistan, having been ruled successively by the Persians, Macedonians, Parthians, Sassanians, and Romans, is exceedingly rich in antiquarian remains, most of which are still unexamined. The great Saladin was of Kurdish descent. In 1880 an extensive Kurdish rising against Persia took place, apparently in the hope of securing independence. The inhabitants, with the exception of certain peculiar and esoteric sects, and the Nestorians, who inhabit the valley of the Tigris, profess Mohammedanism. The chief towns are Bitlis, Van, Urumia, Diarbekr, and Kermanshah.

Kurg. See COORG.

Kuria=Muria Islands, a group of five islands; 21 miles from the S. E. coast of Arabia; area, 21 square miles. The ancient Insulæ Zenobii, they were ceded to England in 1854 by the Imam of Muscat. On one of them is a signaling station of the East-

ern Telegraphs Company. Guano of an inferior quality is obtained from them.

Kuriles (kö'ril-ez), a chain of islands in the North Pacific, extending S. W. to N. E. from Japan to Kamchatka, and belonging to Japan; area, about 5,000 square miles. The whole chain is of volcanic origin, and there are many active volcanoes, one of which is from 12,000 to 15,000 feet high. The population is very scanty.

Kuriologic, a term applied by Warburton to that kind of hieroglyphic writing in which the principal circumstance in the subject stands for the whole. Thus a battle was depicted by two hands, one holding a shield and the other a bow; an insurrection by an armed man casting arrows; a siege, by a scaling ladder, and so on. This was of the utmost simplicity, and consequently it was probably the earliest way of turning painting into a hieroglyphic. He concludes by saying: "This is what we shall hereafter distinguish by the name of the 'curiologic' character."

Kurland. See COURLAND.

Kürnberger, Ferdinand (kürn'bārg-er), a German novelist; born in Vienna, Austria, July 3, 1821. His works are witty, highly poetical, and written in a pithy style. His first novel, "Tired of America" (1856), was his most popular one; it described the American civilization of that period as merely material. Of several volumes of tales, "Selected Tales" (1857) contained his best work. Others of his writings were: The drama "Cataline" (1855); the volume of essays "Seal Rings" (1874); the romance "The Despot of the House" (1876); "Literary Affairs of the Heart" (1877). He died in Munich, Oct. 14, 1879.

Kuropatkin, Alexei Nicolaievitch (kur-ō-pat'kin), a Russian statesman and soldier; born in 1849. He was educated at the Cadet Corps School and the Pavloskoe Military College in St. Petersburg. His story of the Balkan crusade is pronounced by military experts to be a war classic. He distinguished himself in the Russo-Turkish war of 1877-1878; and in the Russo-Japanese war of 1904-1905 was Russian commander-in-chief till superseded by General Linievitch in March, 1905. In 1909 his "Military Memoirs," which severely criticised the Russian Government and imperial family for the results of the war, was suppressed in Russia and published in New York, and in 1911 he was engaged on another critical work, "Russia's Military Problems."

Kuro Sivo, or **Japan Current,** the Gulf Stream of the Pacific; is the offspring of the great equatorial current, flows past Formosa, Japan, the Kuriles, the Aleutian Islands, and thence bends S. to California. It is much inferior to the Gulf Stream, both in volume and high temperature.

Kurrachee. See KARACHI.

Kursk, the chief town of the Russian province of Kursk. The chief industry is tanning; but soap, tobacco, candles, and spirits are also manufactured. Kursk is celebrated for its orchards and has an observatory. Pop. (1897) 52,896. Near the town a fair is held after Easter, when more than $6,500,000 worth of commodities are disposed of, the chief being cotton, silk, and woolen fabrics, sugar, tea, leather, horses, etc. The province of Kursk, in the middle of South Russia, contains 17,931 square miles, three-fourths fertile arable land (black earth). Pop. (1897) 2,396,577. The province is watered by numerous feeders of the Dnieper and the Don.

Kurtz, Johann Heinrich, a German theologian; born in Montjoie, near Aix-la-Chapelle, Dec. 13, 1809; was first destined for a commercial career, but early devoted himself to the study of theology at Halle and Bonn, and became in 1835 religious instructor at the gymnasium of Mitau, in 1850 ordinary Professor of Church History (in 1859 of Exegesis) at Dorpat. His "Bible History" and "Church History" are classics. He retired in 1870, and from that time resided at Marburg, Germany, where he died in 1890.

Kuru, a noted legendary hero of India, the contests of whose descendants form the subject of two great Indian epics.

Kuruman, a mission station of the London Missionary Society in Bechuanaland, about 130 miles N. W. from Kimberley. It was for many years the scene of the labors of Dr. Moffat and Livingstone.

Kurz, Heinrich (körts), a German historian; born in Paris, April 28, 1805. Having suffered two years' imprisonment for articles published in his paper, the Augsburg "Times," he removed to Switzerland, where he held several professorships and made a special study of German literature. The results of his investigations are embodied in the well-known "History of German Literature." Equally important are: "Handbook of the National Poetic Literature of the Germans" (1840–1843); "Handbook of German Prose" (1845–1852). He died in Aarau, Switzerland, Feb. 24, 1873.

Kurz, Hermann, a German novelist; born in Reutlingen, Würtemberg, Nov. 30, 1813. He is best known by his two fine romances, "Schiller's Life in His Native Place," describing Würtemberg at the time Schiller grew up there; and "Mine Host of the Sun," a Swabian popular tale of psychological power. "From the Days of Dishonor" (1871), another strong work, was

historical in tone; "On Shakespeare's Life and Work" (1868) and the text for Konewka's "Falstaff and His Companions" (1872) were critical. He translated from the Italian, Spanish, French, and English masters, and wrote also two volumes of poems. He died in Tübingen, Oct. 10, 1873.

Kusatsu (kö-sats′), a resort in Japan where are numerous hot springs impregnated with minerals. Invalids frequent the place in large numbers. Pop. (1904) 23,000.

Kusi, a considerable tributary of the Ganges, rises in the Nepal Himalayas, to the N. W. of Mount Everest, and flows generally S. in a rapid stream, with a great body of water, to the main river. Its length is about 325 miles, and it is navigable, though with difficulty, by boats of 10 tons, to the Nepal frontier. Its bed is constantly shifting to the W., and its floods have turned wide tracts into sand and jungle.

Küstrin (kust′rin), a town of Prussia and a fortress of the first rank; situated in the midst of extensive marshes at the confluence of the Warthe with the Oder; 51 miles E. of Berlin. It was first fortified in 1535–1543, and was held by the French from 1806 to 1814. Küstrin is also an important railway center. Pop. (1900) 16,473.

Kutabminar (kö-tab-mēn-är′), a column of red sandstone, said to be the highest in the world, which was erected at Delhi, India, to commemorate the victory gained by the Mussulmans over the Rajputs in 1193. This conquest gained for them the sovereignty of the Punjab. The column is 50 feet in diameter at the base and 13 at the top. Its face is covered with inscriptions from the Koran.

Kutch, the packet of vellum leaves in which gold is placed to be beaten. The package of gold beater's skin in which gold leaf is placed for the second beating is called the shoder. After the second beating the pieces are cut up and rearranged in gold beater's skin, the package being called a mold.

Kutchin, the name given to a collection of tribes of the Athabascan stock of North American Indians who live on and near the Yukon river in Alaska, and in the N. W. part of British North America. They are sometimes called Loucheux and Quarrelers. They number something less than 2,000.

Kutusoff, Michael Ilarionovich (kö-tö′sof), a Russian field marshal; born Sept. 16, 1745; entered the Russian army at the age of 16, and in 1784 became Major-General. He distinguished himself in the Turkish War, and was appointed in 1805 to the command of the first army corps against the French. He was second in command of the allied army under the Emperor Alexander at Austerlitz. In 1811–1812 he commanded the Russian army in the war against the Turks. In 1812, notwithstanding his advanced age, he succeeded Barclay de Tolly as commander-in-chief of the army against the French, fought Napoleon obstinately at Borodino, and obtained a great victory over Davoût and Ney at Smolensk. Tolstoi (in "War and Peace") calls him "the genius of Russia and of the war." He died in Bunzlau, April 8, 1813.

Kuvera (kövē′rä), in Hindu mythology, the god of wealth. He resided in the splendid palace of Alaka, on Mount Meru, and is borne through the sky by four attendants on a radiant car given to him by Brahma. He has no temples dedicated to him, and no altars. On his head is a richly ornamented crown, and two of his four hands hold closed flowers of the lotus.

Kuyp. See CUYP.

Kvitka, Grigorii Fedorovitch (kvit′kä), a Russian novelist; born in Osnova (whence his appellation "Osnovianenko"), near Karkov, Nov. 29, 1778. He wrote both in Great and Little Russian, being one of the chief writers in the latter, his works in which were especially dear to his countrymen for presenting pictures of the familiar national life idealized; the most popular was the novel "Maroussia." In Great Russian he published two novels of manners and a number of dramas, the most popular of the latter being "Selmenko." He died in Karkov, Aug. 20, 1843.

Kwalhiokwa (kwäl-ē-ōk′wä), a tribe of North American Indians of the Athabascan stock, formerly living on Willopah river, Washington, near the Lower Chinook Indians. They are often confounded with the Owilapsh or Whilpah.

Kwangsi, a province of China; mountainous, and watered by the numerous branches of the Tao or Sikiang. Rice is largely grown, and gold, silver, and mercury are mined. Area, 78,250 square miles; pop. (1905) est. 5,250,000.

Kwangtung, the most S. province of China, bordering on the Gulf of Tonkin and the China Sea. The N. part is mountainous, but the S. region is about the most fertile in China. It includes Hainan and a number of smaller islands along the coast. The capital is Canton; area, 79,456 square miles; pop. (1905) est. 31,865,251.

Kwan-yin, a divinity of the Buddhists, regarded as the pitying god.

Kwapa, or **Quapaw,** a tribe of the Dhegiha division of North American Indians. They give themselves the name of Ukaqpa, meaning "those who went down stream." Their total number is about 232; some of them live in the Indian Territory

and others are in Oklahoma. The Kwapa were called Akansa by the Illinois, from which comes the name Arkansas.

Kwara. See NIGER.

Kweichau, a province of China. It is rough and mountainous, produces rice, tobacco, and timber, and has mines of copper, iron, lead, and mercury. Area, 64,554 square miles; pop. (1905) est. 7,650,282.

Kwilu, a river of the French West African colony of Gaboon, rises near the Lefimi, and reaches the Atlantic N. of Loango.

Kyanite, a mineral composed of silicate of alumina. It occurs in long prismatic crystals belonging to the triclinic system. The mineral is sometimes colorless, but is usually pale blue, or pale blue mixed with white. It is transparent or translucent, but sometimes opaque, owing to the presence of impurities. The faces of the prisms show different degrees of hardness = 4½, 6, and 7 in the scale. As a rock former it occurs in the crystalline schistose rocks, as in mica schist, where it is often associated with staurolite in gneiss, granulite, eclogite, etc.

Kyanize, a process to prevent the decay of wood, cordage, or canvas, by saturating it with a solution of corrosive sublimate in open tanks or under pressure. A wooden tank is put together so that no metal of any kind can come in contact with the solution when the tank is charged. The solution consists of corrosive sublimate and water, in the proportion of one pound of corrosive sublimate to 10 gallons of water as a maximum strength, and one pound to 15 gallons as a minimum, according to the porosity or absorption of the timber subjected to the process. Oak and fir timber absorb nearly alike, but beech, poplar and elm are more porous. The period required for saturating timber depends on its thickness; 24 hours are required for each inch in thickness for boards and small timbers.

Kyd, Thomas, an English dramatist; flourished in the 16th century. He was one of the most popular English writers of tragedies before Shakespeare, and helped prepare the way for him. His most successful two plays, his first and second works respectively, were "The Spanish Tragedy, or Hieronimo," and "Oratio." They were very popular and were frequently acted, not only in England, but in Germany and in Holland; but the former was much ridiculed by Shakespeare and his contemporaries for its bombastic rant; and "Go by, Jeronimy" (*i. e.*, "Get out, you lunatic"), from the ravings of the distracted hero, became a common phrase.

Kymograph, an instrument for measuring and graphically recording the variations in the pressure of the blood in one of the vessels of a living animal.

Kyoto. See KIOTO.

Kyrie Eleison, two Greek words (= Lord, have mercy on us), which, with Christe eleison (= Christ have mercy on us), have been retained by the Latin Church, and are used in the breviary, the ritual, the litanies, and in the mass. Immediately after the introit the celebrant and his server say alternately Kyrie eleison three times, Christe eleison three times, and once more Kyrie eleison three times. Thomas Aquinas supposes that the first triplet is addressed to God the Father, the second to God the Son, and the third to God the Holy Ghost. Also the response, "Lord have mercy upon us, and incline our hearts to keep this law," sung after the recitation of each of the Ten Commandments in the Communion Service of the Episcopal Church.

Kyrle, John (kurl), an English philanthropist; born in 1664. He was styled the Man of Ross by Pope, having resided for the greater part of his life in the small town of Ross, Herefordshire. He spent his time and fortune in building churches and hospitals, on an income amounting to $2,500 a year. Pope celebrated his praises in his "Moral Essays," and Warton said that he deserved to be celebrated beyond any of the heroes of Pindar. He died in 1724. The Kyrle Society is a modern English association named after him, and was started by Misses Miranda and Octavia Hill in 1875, and founded in 1877 by Prince Leopold and others. The society seeks to bring the influences of natural and artistic beauty home to the lives of the people by means of the decoration of workmen's clubs, of hospital wards, and of dwelling houses; by the encouragement of window gardening; providing concerts for the people; and by securing open spaces, both in town and country, to be laid out as public gardens.

L

l, in the English alphabet, the 12th letter and the 8th consonant; one of those called by some grammarians liquids (l, m, n, r), because, like vowels, they may be pronounced for any length of time, although this characteristic also belongs to s, z, f, v, and other consonants. The sound represented by l is produced by placing the end of the tongue against the fore part of the roof of the mouth, opening the jaws, and gently breathing out the air, which thus escapes from the corners of the mouth. The pronunciation of l, therefore, is not dependent on the teeth; yet there are individuals, and even whole tribes, who do not pronounce it — the former in consequence of some defect in their tongue; the latter because they (for example, the Japanese) always use r instead of l, while others (as the Chinese) always use l instead of r. In the old Zend there was no l. It must be observed that the rolling r is different from the l only in this, that the former is pronounced with a vibration of the tongue, the tip of which scarcely touches the roof of the mouth. Hence the consonant interchange of r and l, in many languages, which it is important for the etymologist to observe. Thus the French *orme*, from the Latin *ulmus;* from the Latin *peregrinus*, the Italian *pellegrino*, the French *pelerin*, the English pilgrim. Of the German word *kirche* (Scotch, *kirk*) the Swiss make *kilche*. The much more frequent change, we presume, is from the r to the l, as from the more difficult to the easier; yet not always. Thus the lower classes in Rome say, instead of *repubblica*, *repubbrica*. How frequent the change of λ and ρ is in Greek, particularly in the Ionian dialect, every philologist knows. L is also interchanged with the liquid n, as in the Latin *lympha*, from the Greek *numphe*. This was especially common in the dialects of ancient Greece. It is likewise found taking the place of d and t, owing to the similarity of the mode of formation of these consonants to the mode in which l is formed. The Latin *lacryma* and the Greek *dakru*, and *odor* for *olor* from *oleo* in Latin, are instances of the first interchange; and the English tongue and Latin *lingua*, of the second. An l following a consonant in Latin is frequently changed into a short i in Italian, as *flaccus, fiacco; flos, fiore; blancus, bianco; glacies, ghiaccio*, etc. This happens also when a short vowel intervenes between the l and the previous consonant, as *macula, macchia*. Sometimes also this consonant is transposed, as in the Spanish *palabra*, from the Latin *parabola*. In Greek the letter was called lambda, the name being derived from the lamed of the Phœnicians and the Hebrews. It is somewhat remarkable that in so many alphabets l is composed, in some way, of two straight lines. The classical and modern Greek is Λ; the Latin L; in short, two straight lines always form this letter. In Spanish ll are pronounced liquid, like the Italian gl before i (like lli in million); and it is peculiar to this language that it begins words with this sound, as *llaneros*. The French ll, if it is preceded by ai, ei, oui, is liquid (*mouillèe*), which in most parts of France is pronounced like the Italian gl in *egli;* but the Parisian pronunciation, originally a mere provincialism, is almost like our y in you, as in *travailler, veiller;* and probably this pronunciation will finally prevail, though it is arbitrary, and against the practice of the majority of the people. An initial ll in Welsh, as in *Llanrwst*, is pronounced like an aspirated l, the tip of the tongue being placed further back in the mouth than for the formation of an ordinary l, and the breath emitted through the teeth on both sides of the tongue. In English l is not pronounced at all in some monosyllables, where it intervenes between a vowel and a subsequent consonant, as in calm, half, balk, chalk, would, could, folks. In those languages in which l is the consonant of the definite article, as in French and Spanish, it has in some cases come to be treated as belonging to the noun following, and in other cases has detached the initial vowel of the noun. The French *lierre* (ivy), formerly written *l'hierre*, from the Latin *hedera*, is an example of the first case; and the Italian *la lena* (breath), for *l'alena*, from the Latin *halena*, is an example of the second.

As a numeral, L signified in Hebrew 30; in Greek, λ =11. L in Latin numeration signifies 50. Λ on Greek coins means Locris, Laconia, Lampsacus, Lacedemonia, etc.; on Roman coins it means Lucius, Lepidus, *libertas, libra, ludos, libens,* etc. L, with a dash over it, meant among the Romans 50,000. L. A. Q. M. is an abbreviation of *literarum artiumque magister;* £, the English abbreviation for pound (sterling), from *libra,* the Latin for pound. See ABBREVIATIONS.

La (lä), in music the 6th of the seven syllables — *ut,* or *do, re, mi, fa, sol, la, si* — representing the seven sounds in the diatonic scale.

Laager, in South African campaigning, a camp made by a ring of ox wagons set close together, the spaces beneath being filled up with the baggage of the company.

Laaland (lâ'länd), or **Lolland** (lol'land), a Danish island in the Baltic, at the S. entrance to the Great Belt, 36 miles long by 9 to 15 broad; area 445 square miles; pop. about 65,000. The surface is remarkably flat, and the soil exceedingly fruitful; forests of beech and oak cover upward of 50 square miles. Capital Maribo; largest town Nakskov, with a good harbor and considerable trade; pop. about 5,000.

Laban, a rich herdsman of Mesopotamia, son of Bethuel and grandson of Nahor, Abraham's brother (Gen. xxiv: 28–31). His character is shown in the gladness with which he gave his sister Rebekah in marriage to the only son of his rich uncle Abraham, and in his deceitful and exacting treatment of Jacob, his nephew and son-in-law. When the prosperity of the one family and the jealousy of the other rendered peace impossible, Jacob secretly departed to go to Canaan. Laban pursued him, but returned home after making a treaty of peace.

Labédoyére, Charles Angélique Huchet, Comte de, a French military officer; born in Paris in 1786; entered the army in his 20th year; and in 1808, when in Spain as aide-de-camp of Marshal Lannes, was severely wounded at Tudela. After his recovery he joined the army in Germany, distinguished himself at the taking of Ratisbon, received a fresh wound at the battle of Esslingen, and was attached to Prince Eugène in the same quality of aide-de-camp. The campaigns of 1812 and 1813 gave him new opportunities of distinguishing himself. Having been severely wounded at the battle of Goldberg in 1813, he was not in active service at Napoleon's abdication, but returned to it under the Bourbons, and was with his regiment near Vizelle when Bonaparte returned from Elba. He immediately joined him, made his public entrance with him into Grenoble, and a few days after was rewarded with the rank of maréchal-de-camp. Shortly after he was appointed lieutenant-general, and made a peer of France. After the battle of Waterloo, where he fought with great courage, he hurried to Paris, and there distinguished himself in the stormy sitting of the Chamber of Peers on June 22 by his hostility to the Bourbons. On the capitulation of Paris he followed the army behind the Loire. Having determined to emigrate, he returned once more to Paris in order to take leave of his family, but was immediately apprehended and brought before a court-martial. His defense, though conducted with great spirit, was unavailing, and he was sentenced to be shot (Aug. 15, 1815). On appeal the sentence was confirmed, and on Aug. 19, was carried into execution.

Labeo, Quintus, and **Antistius** (lā'buh-ō), the name of two Roman jurists, father and son; the first, after the battle of Philippi, in which he fought for Brutus and Cassius, imitated his leader, and despairing of their cause fell on his sword, and was buried under his tent. The second left behind him 400 treatises on forensic subjects; but being slighted by Augustus Cæsar, he only rose to the rank of prætor, and died with the reputation of a sound lawyer, A. D. 20.

Labiatæ (-ā'tē), in botany, labiates, a large order of perigynous exogens, alliance Echiales. It consists of herbaceous plants or undershrubs, with four-cornered stems, opposite leaves without sitpules, covered with receptacles of aromatic oil; flowers in opposite, nearly sessile, axillary, whorl-like cymes, sometimes solitary, or as if capitate; calyx tubular, persistent, inferior, 3, 5, or 10-toothed; corolla monopetalous, hypogynous, bilabiate, the upper lip undivided or bifid, overlapping the lower one, which is larger and three-lobed; stamens four, didynamous (two long and two short), or only two; ovary so deeply four-lobed that Linnæus considered it to consist of four naked seeds; seeds four, erect; style one, from the base of the ovary. Akin to the *Verbenaceæ* and the *Boraginaceæ.* Distribution wide. They abound especially between lat. 40° and 50° N. They constitute $\frac{1}{24}$ the flora of France, and $\frac{1}{26}$ that of Germany. No poisonous plant belongs to the order, though there are 120 genera and about 2,500 known species. It is divided into 11 sections: *Ocimeæ, Mentheæ, Monardeæ, Satureæ, Melisseæ, Scutellarieæ, Prostanthereæ, Nepeteæ, Stacheæ,* and *Ajugeæ.* The order *Labiatæ* is called also *Lamiaceæ.*

Labiche, Eugène (lä-bēsh'), a French comedy-writer; born in Paris, May 5, 1815. Of over 100 comedies, vaudevilles, farces, etc., of his writing, almost all possessed strong qualities, including striking dialogue, caustic yet never cruel humor, and stage

technique, while several were models of their kind. Among the best are: "The Italian Straw Hat" (1851); "The Misanthrope and the Auvergnat" (1853); "Eye Powder" (with Martin, 1862); "Célimare the Well-Beloved" (1863); "Cagnotte" (1864); "One Foot in Crime" (with Choler, 1866); etc. ("Dramatic Works," 10 vols. 1878–1879.) He wrote a number of pieces in collaboration. He died in Paris, Jan. 23, 1888.

Labium (Latin, "a lip"), in zoölogy, a term applied to the lower lip of the insects and other *Arthropoda*, the upper part being called the labrum. The term is also applied to the inner lip of the shell of univalve mollusks; the outer lip being the labrum.

Lablache, Luigi (lä-bläsh′), a noted opera singer; born in Naples, Italy, Dec. 6, 1794. His father was a Frenchman who had fled from Paris during the Revolution, his mother an Irishwoman. His first engagement as a singer was at the San Carlino Theater at Naples in 1812. He afterward sang with much success at Palermo (till 1820), at Milan, Rome, Turin, and Vienna; in the last-named city a medal was struck in his honor. From 1830 to 1852 he sang nearly every winter at Paris, and annually made visits to London, St. Petersburg, and various cities in Germany. In London he was perhaps a greater favorite than even the wonderful Grisi. His voice, a deep bass, has hardly ever been equalled either in volume or quality; and his acting, particularly in the characters of Figaro, Don Bartolo, Don Pasquale, Leporello, etc., was almost as remarkable as his singing. He gave instruction in singing to Queen Victoria. He died in Naples, Jan. 23, 1858.

Labor. See BIRTH.

Labor, in political economy, may be defined as effort for the satisfying of human needs. It is one of the three leading factors in production, the other two being land (or natural objects) and capital; and it is more fundamental than capital, which originally is the result of labor. In the vast circle of industry labor has a great variety of functions, which may be thus classified: (1) Producing of raw materials, as in mining and agriculture; (2) manufacturing in the widest sense of the word, or transformation of raw materials into objects serviceable to man; (3) distribution, or transference of useful objects from one place to another, as determined by human needs; (4) personal services rendered by physicians, teachers, etc.

A distinction insisted on by many economists is that into productive and unproductive labor. The former consists of those kinds of exertion which produce utilities embodied in natural objects. Unproductive labor, like that of the musician, while both useful and honorable, does not add to the material wealth of the community. Though it has the appearance of undervaluing some of the highest services that can be rendered to the community, the distinction has a general validity. Labor directly employed in rendering natural objects serviceable to man may in the language of political economy be distinctively called productive. But in order to obviate a too narrow and abstract view of the subject it is hardly necessary to point out that the labor of the physician or teacher may be indirectly most productive, inasmuch as it increases the efficiency of the workman by promoting his health and intelligence. And apart from the special services rendered by great teachers and artists, and which cannot be measured in material wealth, they raise the general level of production, and even of material civilization, by inspiring men with finer tastes and higher needs. For the wants to which productive labor ministers vary at different stages of social development, and grow more refined as the human race advances.

The social and legal forms in which labor has appeared have also varied with the progress of civilization. In the early stages the labor of the chase, fishing, etc., was performed by the men, while the drudgery devolved on the women and slaves. But at that stage few slaves existed. It was not till the agricultural stage was reached that conquering tribes spared the conquered in order to utilize their services as workers. Ancient civilization was based almost entirely on compulsory labor. The pyramids and other great works of Egypt and Babylonia were possible only because governments could command forced labor on a colossal scale. The more highly developed societies of Greece and Rome rested on the same basis.

It is a disputed question how far free labor existed in the early Teutonic settlements of England and other countries. The question is evidently one of degree, for the Germans possessed slaves long before the great emigrations began, and even in England they did not entirely exterminate the natives. The mediæval organization of society, where definitely constituted, rested on serfdom — *i. e.*, the mass of the workers were attached to the soil and rendered fixed services in labor, in kind, and latterly in money. While the condition of serfdom greatly varied, there can be no doubt that its tendency was to depress the free and raise the servile cultivators to something like a common level. The free workers of the towns organized themselves in GUILDS (*q. v.*). In the course of the 14th century serfdom began to pass away in England. Its disappearance was followed by enactments for the regulation of labor in the in-

Labor

terest of the ruling classes. The first and one of the greatest examples of this was the "Statute of Laborers," occasioned by the scarcity of labor consequent on the Black Death. The main object of this statute, which was passed in 1349 and was repealed only in the early years of Elizabeth, was to fix the amount of wages; and it was superseded by a statute of Elizabeth, which, besides ordaining an apprenticeship of seven years, empowered the justices in quarter sessions to fix the rate of wages both in husbandry and handicrafts. This act of Elizabeth was not repealed till 1814. The poor law enacted at the close of her reign in 1601 may be described as a method of supplementing the low wages fixed by the justices.

Toward the close of the 18th century the effect of the industrial revolution was to organize labor in large factories and similar undertakings; and in the early decades of the 19th the growing ideas of freedom had begun to make other great changes in the condition of the workers. The right of combination received in 1824 was utilized in the formation of trades unions and co-operative societies, and the admission of the workingmen to the franchise has given them a share in the political life of the country. Changes similar to those in England have taken place, only much later, in the countries of the European continent. The emancipation of agricultural labor from serfdom, which was effected in France at the Revolution of 1789, was not completed in Central Europe till 1848, and in Russia not till 1861. Laws for the regulation of labor are now intended not to fix wages as formerly, but to protect the weaker class of workers. Such are the Factory Acts in England, which also have been followed by a corresponding development elsewhere. Efforts for the international organization of labor, proceeding from socialism, have been followed by the international conference for the regulation of labor, which met at Berlin in 1890.

Another great result of social evolution in the most advanced countries of the world has been more or less conscious and definite constituting of the laboring class as a separate class, with interests at variance with those of the possessors of land and capital. The solution of the questions connected therewith is now universally regarded as the most pressing duty of statesmen and economists.

Labor, American Federation of. On Aug. 20, 1866, delegates from sixty labor organizations met in Baltimore and founded a permanent national organization, the "National Labor Union." Subsequent conventions of this body were held in Chicago, 1867; Pittsburg, 1868; New York City, 1868; Chicago, 1869; Boston, 1870; Philadelphia, 1871, and Columbus, 1872. At this last convention the mistake was made of nominating a Presidential ticket, and rapid disintegration at once ensued. At length 107 delegates, representing over a quarter of a million of workers, met in Pittsburg, Pa., on Nov. 15, 1881, and established the "Federation of Organized Trades and Labor Unions of the United States and Canada." Many, if not all, of the ideas adopted in their political demands have since been taken up and presented by other organizations of labor. A legislative committee was appointed, which presented several measures to Congress, an important one — a national bureau of labor statistics — being finally secured in 1883.

The sixth convention of the Federation was held in Columbus, on Dec. 8, 1886. The old Federation was dissolved, a more perfect plan of organization was adopted, and the name American Federation of Labor chosen. A constitution was adopted stating the main objects of the organization to be: "The encouragement and formation of local unions, and the closer federation of such societies, through central trade and labor unions in every city, with the further combination of these bodies into State, Territorial and Provincial organizations to secure legislation in the interests of the working masses; the establishment of national and international trade unions, based upon a strict recognition of the autonomy of each trade, and the promotion and advancement of such bodies, and the aiding and encouragement of the labor press of America." The constitution also provides that "Party politics . . . shall have no place in the conventions of the American Federation of Labor."

The American Federation of Labor is composed of constituent and representative bodies; in the former category are included federal labor unions, independent local unions, national unions, and international unions, while the representative bodies are classified as central labor unions and as State branches. Federal labor unions are societies consisting of wage earners working at different trades. These unions are established only in localities where there are not enough workers engaged at the several trades to form separate unions of such trades. Independent local unions are also bodies directly affiliated with the American Federation of Labor, and are composed of members working at the same trade; but the independence of such unions is recognized only while there are as yet too few unions of a certain trade to permit the formation of a national union of that trade. In 1910 there were 118 national and international unions, representing approximately 27,000 local unions; 38 State branches; 594 city centrals; and 573 local

trade and federal labor unions. The total number of unions was 28,777, and the total membership about 2,000,000.

The supreme power of the American Federation of Labor is vested in its convention. The revenue is derived mainly from a tax levied on each union at the rate of one-half of one cent per month from each member in good standing of international unions, of ten cents per month from each member of local and federal unions having no international, five cents of which is applied to a defense fund, and of a fixed tax of $2.50 per quarter from each city and State body. The Executive Council (composed of the officers) also has power to levy assessments on all affiliated unions, to sustain unions engaged in industrial conflicts; the levies not to exceed one cent per member per week, and to be made for not more than 10 weeks in each year. On Oct. 1, 1904, the expenses for the year then ended were $203,991.15; the balance on hand was $103,017.94. The official organ of the Federation is the "American Federationist," published monthly.

Labor, Court of. At the conference of representatives of capital and labor, held in New York, Dec. 17, 1901, under the auspices of the National Civic Federation, a permanent board was appointed to settle differences between the employees and the labor unions. This board is composed of prominent delegates on behalf of the public, representatives of organized labor, and representative employers. Its accurate designation is "The Industrial Department of the National Civic Federation." See NATIONAL CIVIC FEDERATION.

Labor Day, a legal holiday, by State enactment only, observed on the first Monday in September in the principal manufacturing and industrial States, when ordinary labor is suspended, and labor organizations parade the streets and hold meetings. In Europe, as a result of the Labor Conference at Berlin in 1890, in many parts of the Continent May 1 to some extent has come to be observed as a labor holiday.

Labor, Department of, an office of the United States Government, created in 1888, to collect and report information regarding labor, wages, capital, etc. From 1903 its duties have been vested in the Department of Commerce and Labor.

Laboratory, a building or workshop designed for investigation and experiment in chemistry, physics, etc. It may be for special research and analyses, or for quite general work. To the former class belong the laboratories which are attached to dyeworks, color works, chemical and similar works. Laboratories are also attached to mining and metallurgical schools, mints, arsenals, etc. A general laboratory, such as might be attached to a school or university, has to include a variety of specialties partly because the whole science and its applications have to be taken into account and exhibited, partly because students with very different aims frequent such places. In England the ammunition manufacturing department in Woolwich arsenal, organized in 1885, is called the Royal Laboratory.

Laborde (lä-bord'), **Alexandre Louis Joseph, Comte de,** a French writer of travels; born in Paris, Sept. 17, 1773. He wrote: "Picturesque and Historic Journey in Spain" (1807–1818; new ed. 1823); "Description of the New Gardens and Ancient Castles of France" (1808–1815); "The Monuments of France" (1816–1836); "Picturesque Journey in Austria" (1821–1823); "Descriptive Itinerary of Spain" (3d ed. 1827–1831); "Versailles, Ancient and Modern" (1840). He was a soldier, accompanying Napoleon to Spain and Austria, and a politician. He died in Paris, Oct. 24, 1842.

Laborde, Léon, Marquis de, a French miscellaneous writer, son of Alexandre; born in Paris, June 15, 1807. Having accompanied his father on a trip to the East, he wrote: "Journey in Arabia Petræa" (1830–1833); "Journey in the East" (1837–1862); "History of Engraving" (1839); "The Dukes of Burgundy" (1849–1851); "Account of the Enamels, Jewelry, and Various Objects on Exhibition in the Galleries of the Louvre" (1853); "The Renaissance of the Arts at the Court of France. Vol. I.: Painting" (1855). In the revolution of 1830 he was General Lafayette's adjutant, was afterward in the diplomatic service at London, The Hague, and Cassel, and succeeded to his father's office. He died in Paris, March 25, 1869.

Labori, Fernand, a French lawyer; born in Reims, France, April 18, 1860; was educated in Germany, England, and Paris, and called to the bar in 1884. Subsequently he was elected Deputy for Reims, in 1893, and took part in many famous cases, notably that of the Dreyfus appeal. He was the author of an "Encyclopedia of French Law," published in 12 volumes.

Labor Legislation, laws enacted relating to industry.

Anti-boycotting and Anti-blacklisting Laws.— The States having laws prohibiting "boycotting" in terms are Colorado, Illinois, and Wisconsin. The States having laws prohibiting "blacklisting" in terms are Alabama, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Minnesota, Missouri, Montana, Nevada, North Dakota, Oklahoma, Utah, Virginia, and Wisconsin. The following States have laws which may be fairly construed as prohibiting "boycotting": Alabama, Connecticut, Florida, Georgia, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri,

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New Hampshire, New York, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Vermont, and Wisconsin. The following States have laws which may be fairly construed as prohibiting "blacklisting": Georgia, Michigan, New Hampshire, New York, Oklahoma, Oregon, Rhode Island, and South Dakota. In the following States it is unlawful for any employer to exact an agreement, either written or verbal, from an employee not to join or become a member of any labor organization, as a condition of employment: California, Colorado, Idaho, Indiana, Massachusetts, Minnesota, Missouri, New Jersey, New York, Ohio, and Pennsylvania.

Eight-hour Laws.— In California, eight hours of labor constitute a day's work, unless it is otherwise expressly stipulated by the parties to a contract. A stipulation that eight hours of labor constitute a day's work must be made a part of all contracts to which the State or any municipal corporation therein is a party. But in the case of drivers, conductors and gripmen of street cars for the carriage of passengers, a day's work consists of 12 hours. Employment of minor children for more than eight hours per day is absolutely prohibited, except in vinicultural or horticultural pursuits, or in domestic or household occupations.

In Colorado, eight hours constitute a day's work for all workingmen employed by the State, or any county, township, school district, municipality, or incorporated town.

In Connecticut, eight hours of labor constitute a lawful day's work unless otherwise agreed.

In the District of Columbia, eight hours constitute a day's work for all laborers or mechanics employed by or on behalf of the District of Columbia.

In Idaho, eight hours' actual work constitute a lawful's day's work on all State and municipal works.

In Illinois, eight hours are a legal day's work in all mechanical employments, except on farms and when otherwise agreed; does not apply to service by the day, week, or month, or prevent contracts for longer hours.

In Indiana, eight hours of labor constitute a legal day's work for all classes of mechanics, workingmen, and laborers, excepting those engaged in agricultural and domestic labor. Overwork by agreement and for extra compensation is permitted. The employment of persons under 14 years of age more than eight hours per day is absolutely prohibited.

In Kansas, eight hours constitute a day's work for all laborers, mechanics, or other persons employed by or on behalf of the State or any county, city, township, or other municipality.

In Nebraska, eight hours constitute a legal day's work for all classes of mechanics, servants, and laborers, execept those engaged in farm or domestic labor.

In Missouri, eight hours constitute a legal day's work. The law does not prevent an agreement to work for a longer or a shorter time and does not apply to laborers and farm hands in the service of farmers or others engaged in agriculture.

In Montana, eight hours constitute a legal day's work for persons engaged to operate or handle any first-motion or direct-acting hoisting engine, or any geared or indirect-acting hoisting engine at any mine employing 15 or more men underground when the duties of firemen are performed by the person so engaged; also for any stationary engineer operating a stationary engine developing 50 or more horse power when such engineer has charge or control of a boiler or boilers in addition to his other duties. The law applies only to such steam plants as are in continuous operation or are operated 20 or more hours in each 24 hours, and does not apply to persons running any engine more than eight hours in each 24 for the purpose of relieving another employee in case of sickness or other unforeseen cause.

In New Jersey, eight hours constitute a day's labor on any day whereon any general or municipal election shall be held.

In New York, eight hours constitute a day's work for mechanics, workingmen, and laborers, except in farm or domestic labor, but overwork for extra pay is permitted. The law applies to those employed by the State or municipality, or by persons contracting for State work.

In Ohio, eight hours shall constitute a day's work in all engagements to labor in any mechanical, manufacturing, or mining business, unless otherwise expressly stipulated in the contract. But in case of conductors, engineers, firemen, or trainmen of railroads, a day's work consists of 10 hours.

In Pennsylvania, eight hours of labor shall be deemed and held to be a legal day's work in all cases of labor and service by the day where there is no agreement or contract to the contrary. This does not apply to farm or agricultural labor by the year, month, or week, to labor in factories, laundries, and renovating establishments, or to labor on street railways. Eight hours out of the 24 shall make and constitute a day's labor in penitentiaries and reformatory institutions receiving support from the State, also for all mechanics, workmen, and laborers in the employ of the State, or of any municipal corporation therein, or otherwise engaged on public works; this shall be deemed to apply to mechanics, workingmen, or laborers in the employ of persons contracting with the State, or any municipal corporation therein, for the performance of public work.

In Utah, eight hours constitute a day's work on all public works and in all underground mines or workings, smelters, and all other institutions for the reduction or refining of ores.

In Wisconsin, in all engagements to labor in any manufacturing or mechanical business, where there is no express contract to the contrary, a day's work shall consist of eight hours; but the law does not apply to contracts for labor by the week, month, or year. In all manufactories, workshops, or other places used for mechanical or manufacturing purposes, the time of labor of children under the age of 18, and of women employed therein, shall not exceed eight hours in the day.

In Wyoming, eight hours' actual work constitute a legal day's work in all mines and public works.

In the United States, eight hours shall constitute a day's work for all laborers, workmen, and mechanics who may be employed by or on behalf of the United States.

Labor Strikes. See STRIKES.

Labouchere, Henry (lä-bö-shār′), an English journalist and politician; born in London in 1831. He was in the diplomatic service, part of the time at Washington, in the United States, and a member of Parliament. An advanced republican, he used "Truth," the journal established by him in 1876 as a society and political organ, for the promulgation of his ideas, often thereby getting into serious difficulties. He wrote "Diary of a Besieged Resident in Paris" (1871).

Laboulaye, Edouard René Lefebvre de (lä-bö-lā′), a French jurist and historian; born in Paris, Jan. 18, 1811. He was appointed Professor of Comparative Jurisprudence in the Collège de France in 1849, having already won distinction by several treatises on Roman and French law. After the foundation of the second empire he constantly strove to rouse opposition to it and to keep alive the Republican spirit. He contested three seats unsuccessfully as a Liberal Republican candidate, and in several published works as well as in his lectures he held up the American constitution to the admiration of his countrymen. He sacrificed his popularity, however, by his support of the plebiscite in 1870, and soon afterward he had to give up his chair at the Collège de France because of the persistent demonstrations made against him. After the fall of the empire he was elected for Paris in 1871 and became a life senator in 1875. His greatest work outside of the field of jurisprudence is a "Political History of the United States, 1620–1789" (3 vols. 1855–1866). He wrote also "The United States and France" (1862) and the satiric novel "Paris in America" (1863), which had a very large circulation (27th ed. 1872). His novel of "Prince Caniche" (1868) reached a 20th edition. But by far his best-known works of fiction are the three series of "Blue Stories"—tales of fairies, elves, enchanters, etc., original and retold. Some of his essays on contemporary political and social questions have been collected and published under the titles "Contemporary Studies of Germany and the Slavic States" (1856); "Religious Liberty" (1858). He died in Paris, May 25, 1883.

Labourdonnais, Bertrand François Mahé de (lä-bör-do-nā′), a French naval officer; born in St. Malo, France, Feb. 11, 1699. Already in 1723 he was captain in the naval service of the French Indies. Next year he distinguished himself so greatly at the capture of Mahé on the Calabar coast that he was permitted to add its name to his own. In 1734 he was appointed governor of the islands Ile de France and Bourbon, and his wise measures soon made them flourishing colonies. In 1740 he was given command of a squadron in East Indian waters, and during the next five years he inflicted great loss on England. In September, 1746, he compelled Madras to capitulate, but failed to push his success in consideration of a contribution of 9,000,000 livres. Accused by Dupleix of betraying the interests of the company, he returned to Paris in 1748, where he languished three years in the Bastille, but was set free and declared guiltless in 1752. He wrote his "Memoires" in 1750. A monument was erected to his memory in 1859 at Port Louis on the Ile de France. He died Sept. 9, 1753. His grandson, BERTRAND FRANÇOIS MAHÉ DE LABOURDONNAIS (1795–1840), was a famous chess-player, and wrote a "Life" of his grandfather (1827).

Labrador, the N. E. peninsula of the North American continent, lying between Hudson Bay and the Gulf of St. Lawrence, extending from lat. 49° to 63° N., and from lon. 55° to about 79° W.; greatest length from the Strait of Belle Isle to its N. cape, Wolstenholme, 1,100 miles; area, 420,000 square miles; pop. about 6,000, collected chiefly at the Moravian missionary stations—Nain (1770), Okkak, Hebron, Hopedale, etc. The Atlantic coast is stern and precipitous (1,000 to 4,000 feet high), entirely destitute of vegetation, deeply indented with narrow fjords, and fringed with chains of rocky islands. The inner parts have been but very imperfectly explored; the greater part consists of a plateau, about 2,000 feet above sea-level, and mostly covered with fine forest trees, firs, birches, etc. Numerous lakes, including Mistassini, also exist inland, and, connect-

ing with the rivers, afford in summer continuous waterways for great distances. The only inhabitants of this interior plateau are Cree Indians, nomads. There are numerous rivers, 200 to 300 miles long and 2 and 3 miles wide at their mouths, flowing toward the Atlantic and Hudson Bay. The Grand Falls on Grand river are believed to be among the largest (calculated to be little short of 2,000 feet in height) in the world. These rivers abound in fish, especially salmon and white fish. The principal fur-bearing animals are bears, wolves, foxes, martens, otters, beavers, lynxes, etc., which are trapped by the inhabitants in winter. Of the mineral resources little is known; but iron and LABRADORITE (*q. v.*) are certainly abundant. The climate on the coast is very rigorous, owing mainly to the ice-laden Arctic current which washes the shores. The short three months' summer is marred by the swarms of mosquitoes and black flies. The mean annual temperature at the missionary stations varies from 22° to 28°. The winter is dry, bracing, and frosty. Since 1809 the coast region has been annexed for administrative purposes to Newfoundland. The remaining parts of the peninsula are designated the Northeast Territory. By far the most important wealth of Labrador is its fish — cod, salmon, herring, and trout. As many as 30,000 fishermen from Newfoundland, Canada, and the United States visit its fishing grounds in the season. The annual catch is valued at more than $5,000,000. The coasts of Labrador were probably visited by the Norsemen about the year 1000; they were again sighted by Cabot in 1498. In 1500 a Portuguese navigator, Cortereal, seems to have visited it and to have given it its name, which means "laborers' land."

Labradorite (named from the locality whence first obtained), in mineralogy, a member of the felspar group, in which the protoxide bases are lime and soda, the sesquioxide base being alumina. Crystallization, triclinic; independent crystals, however, are rare. Twin habit very common, the repetition of one form of twin producing a lamellar structure. Cleavages, three; the first very distinct, the second less so, of the third only traces. Luster on principal cleavage pearly, passing into vitreous; elsewhere vitreous or sub-resinous. Hardness, 6; sp. gr., 2.67–2.76; fracture imperfectly conchoidal; streak white; translucent. Doubly refracting, optical properties, analogous to those of albite and anorthite, but much obscured by the pressure of twin lamellæ. Colors, gray, brown, greenish; sometimes colorless. The cleavable massive varieties sometimes exhibit, in the direction of the second cleavage, a lively play of color, blue and green predominating, but fire-red and yellow also occur. This phenomenon has not yet received a satisfactory explanation. It is most marked in that from Labrador, which also frequently includes numerous excessively thin, minute crystals which have been referred to göthite and hæmatite. It forms an essential constituent of many rocks, in which it is associated with hornblende, augite, diallage, or hypersthene, also in many modern lavas; in distinct crystals in those of Etna and Vesuvius. The colored varieties are sometimes used in jewelry. Called also Labrador felspar.

Labrador Tea, a name given to two species of the genus *Ledum* (*L. latifolium* and *L. palustre*). They grow in the N. of Europe, and in America N. of Pennsylvania. They are species of heath, and are low shrubs with alternate entire leaves clothed underneath with rusty wool. The fragrant crushed leaves are used by the natives of Labrador as a substitute for tea. They possess narcotic properties, render beer heady, and are used in Russia in the manufacture of leather.

Labrunie, Gérard. See GERARD DE NERVAL.

Labrus (lā′-), plural **Labridæ** (lab′ri-dē), a genus and family of acanthopterygious fishes, the species of which are very numerous in tropical seas. The *Labridæ* family (wrasses, or rock fish, as they are also called) are chiefly remarkable for their thick fleshy lips, their large and strong conical teeth, their oblong scaly body, and their brilliant colors. They are further generically distinguished by a single dorsal fin, extending nearly the whole length of the back, part of the rays spinous, and behind the point of each spinous ray a short membranous filament. To this family belongs the black fish, or tautog, *Labrus Americanus*, 6 to 18 inches long, common on the coast of New England, and highly prized as food.

La Bruyère, Jean de (lä brü-yār′), a famous French moralist and satirist; born in Paris, August, 1645. Appointed tutor of the dauphin, he spent a large part of his life at the court of Louis XIV. His great work, on which his reputation rests, "The Characters of Theophrastus, Translated from the Greek, with the Characters or Manners of this Century" (1688), was a cloak for the keenest and most sagacious observations on the characters and manners of the court. It abounds in wit, shows him to have been an excellent judge of men, and is written in an admirable style. The number of "characters" was greatly increased as the various editions came out. Numerous keys appeared, the first in 1720. It has been translated into well-nigh every modern lan-

guage. A true philosopher, desiring but to lead a quiet life with his books and friends, only his worth and tact enabled him always to preserve his dignity among the ignorant and arrogant courtiers. He died in Versailles, May 10, 1696.

Labuan (lä-bö-än′), an island six miles from the N. W. coast of Borneo; area 30¼ square miles; pop. (1904) est. 5,853, mostly Malays and Chinese, with 30 Europeans. Besides possessing a good harbor (Victoria), it has an extensive bed of excellent coal; in 1895 44,443 tons were exported. Labuan is an active market for the products of the neighboring islands (Borneo and the Sulu Archipelago) — sago, edible birds'-nests, camphor, gutta-percha, india-rubber, rattans, pearls, tortoise-shells, and beeswax. Sago flour is manufactured. Exports (1898) $398,805; imports (1898) $464,415. The island became British in 1846, and since 1890 is administered by the British North Borneo Company. Capital, Victoria.

Laburnum, the *Cytisus Laburnum,* an ornamental shrub or tree of the natural order *Leguminosæ,* belonging to a genus to which the common broom is often referred. It is a native of the mountainous regions of Southern Europe, and is much planted in pleasure grounds on account of its glossy ternate leaves, composed of small oval leaflets, and its graceful racemes of beautiful yellow flowers like those of the broom, which come forth in great abundance in May and June. The laburnum often grows to a height of from 20 to 30 feet. The heartwood, which is of a dark reddish brown color and capable of receiving a high polish, is used for many purposes, as in making wedges, pulleys, pegs, handles of knives and other instruments, and in inlaying. Many of the purposes for which it was once used are now supplied by lignum vitæ.

All parts of the plant, and especially the seeds, are possessed of narcotic and poisonous qualities. The eating of the seeds by children has often produced fatal results, but hares and rabbits eat the bark with impunity, and are very fond of it. The narcotic and poisonous effects are produced by cytisin. Several varieties and allied species are found in cultivation. *C. alpinus,* the so called Scotch laburnum, has its leaves broader and its flowers darker in color. One of the most remarkable forms is the variety *Adami* of the common species, in which yellow, purple, and yellowish purple flowers are found in the same plant. It was originally produced by grafting *C. purpurens* on the common species.

Labyrinth, with the ancients, a more or less subterranean building containing such a number of chambers and galleries, one running into the other, as to make it very difficult to find the way through it. The Egyptian labyrinth, the most famous of all, was situated in Central Egypt, above Lake Mœris, not far from Crocodilopolis (Arsinoe), in the district now called the Fayoum. Its construction has been attributed to various persons, but researches on the spot have shown that part of the structure was built by Amenemhe III. about 2,000 B. C., and it is believed that the portion more particularly known as the Labyrinth was built as late as the 7th century B. C. by the Dodecarchs or 12 contemporaneous kings, as stated by Herodotus. The building, half above and half below the ground, was one of the finest in the world, and is reported to have contained 3,000 rooms. The passages were so intricate that no stranger could find the way without a guide. It is said that in the lower rooms the coffins of the builders of this immense fabric and of the sacred crocodiles were deposited, and that the upper rooms excelled in splendor and art all human works. Respecting the interior construction and the purpose of the labyrinth of Crete we know still less, if indeed it was not altogether mythical. The ancient writers consider this subterranean cavern to have been built by Dædalus in imitation of that of Egypt, but on a smaller scale, by order of Minos, who confined there the Minotaur.

According to other writers it was a temple of the latter. Its existence was probably suggested by traditions connected with an extensive cavern near Cnossus, still locally known as the Labyrinth. The labyrinth at Clusium was erected by the Etruscans, according to Varro, for the sepulcher of King Porsenna. It was described as a square building of stone, 50 feet in height and 30 on each side. At each corner stood a pyramid, and also one in the center, each 150 feet high, and at the base 75 feet wide. But as it was undiscoverable in the time of Pliny its existence seems problematical. There were other labyrinths at Lemnos and Samos, but their sites are unknown. These edifices were not built for the purpose of making people lose their way; this was merely an accidental peculiarity, on account of which various confused aggregates of things have been called labyrinths. Imitations of labyrinths, called mazes, were once fashionable in gardening. They were made of hedges of privet or other shrub. The best known is that at Hampton Court.

Labyrinthodon (-rinth′-), a genus of fossil amphibians whose remains are found in the Carboniferous, Permian, and Trias formations, those of the Trias being found in England, India, and Africa. They were allied to the crocodile and to the frog, and were from 10 to 12 feet long. The name is derived from the labyrinthine structure of a

section of the tooth when seen under the microscope. The hypothetical cheirotherium has been identified with the labyrinthodon.

LABYRINTHODON.

Lac, or **Lak,** from the Sanskrit *lakshâ* or *laksha*, that is, 100,000. In the East Indies it is applied to the computation of money. Thus, a lac of rupees is 100,000.

Lac, in botany, etc.: (1) A resinous incrustation caused by the parasitic insect *Coccus lacca.* The incrusted sticks are called stick lac. If broken off from the twigs, and washed in water, the resin breaks into small particles called seed lac; and, if this be melted over a fire, and squeezed through a long sac into troughs, it spreads out into thin flakes, shell lac; if dropped into rounded masses, it is button lac; if into larger pieces, it is sheet lac or piece lac. Lac is called also East Indian kino. (2) A white, orange, or other-colored fluid occurring in many plants. (3) A gummy substance produced by *Aleurites lac.* In pharmacy, a decoction of shell lac is much used in India in the preparation of several medicinal oils. The Tamul doctors prescribe lac in old and obstinate bowel complaints. See LACQUERING.

La Caille, Nicolas Louis de (lä käy′), a French mathematician and astronomer; born in Rumigny, Ardennes, France, March 15, 1713. He became assistant to Cassini at the Observatory of Paris, and afterward Professor of Mathematics at the College Mazarin. In 1750 he visited the Cape of Good Hope for the purpose of studying the stars of the Southern Hemisphere, and he determined the position of 9,000 previously unknown. The table of eclipses for 1,800 years, inserted in the "Art of Verifying Dates," was calculated by La Caille. His principal works are: "Principles of Astronomy"; "Course in Pure Mathematics"; "Stars of the Southern Heavens"; etc. He died in Paris, France, March 21, 1762.

Lac Ammoniacum (-nī′a-kum), milk of ammoniacum, from its resembling that fluid in appearance. A mixture prepared by rubbing, slowly and perfectly, down a certain quantity of the ammoniacum with water, till the whole, by steady and careful trituration, is suspended in the water. This makes one of the best expectorant mixtures in the pharmacopœia for coughs, colds, and hoarseness.

Lacandones (lä-kän-dō′nes), an Indian tribe living in Northern Guatemala and neighboring portions of Mexico. They were at one time numerous and powerful and waged war against the whites till about 1750. There are now but a few thousand left, of whom a part are friendly to the white people, though retaining their native customs, while the remainder refuse all intercourse with the other inhabitants.

Laccadives (lak′a-dīvz), a group of 14 coral islands in the Arabian Sea; about 200 miles W. of the Malabar coast; between lat. 10° and 14° N.; area, 744 square miles; pop. (1891) 14,440. They are low and flat, and all but two are comparatively barren. The cocoanut is the chief plant, and coir (cocoanut fiber) the staple product; this and jaggery, cocoanuts, copra, tortoise-shell, and cowries are carried over to the mainland by the men, who are brave and skillful sailors. The annual exports average about $85,000. The group was discovered by Vasco da Gama in 1499. The N. islands are attached to the Madras district of South Kanara; the rest belong to the rajah of Cannanore, but since 1877 have been administered by the collector of Malabar. The people are Mohammedans of Hindu descent, their language Malayalam, except in Minikoi, which properly belongs to the Maldive group and retains its language.

Lace, an ornamental fabric of threads so interwoven, twisted, braided, and knotted as to form definite patterns of contrasted open and close structure. The origin of lace is unknown, but it is of great antiquity. Lace as we know it today is of comparatively recent origin; and the finest quality is undoubtedly the outgrowth of art embroidery on linen, though cotton, silk, gold and silver threads are also used in the modern varieties. It is claimed that the art of embroidery was developed into needle lace early in the 15th century, by Greek refugees, who brought their art from the Ionian Islands to Venice, where at first it was devoted almost exclusively to the enrichment of church vestments, and where its production was confined to the religious orders to such an extent that it was known as "Nun's work." By the middle of the 17th century lace had become the most desired adornment; and at the time when Colbert introduced its manufacture into France, under royal patronage, in 1660, it was so highly prized that extravagant nobles mortgaged their châteaux to obtain decorations for their boot-tops and jabots for their necks. From then till the introduction of machine-made lace early in the 19th century, lace making remained one of the great indus-

tries of Italy, Spain, France, the Netherlands, and the S. of England.

Though we have three distinct methods of lace-making, combinations of the whole may be found in one piece of modern lace, and frequently the products are so similar that it requires experience and close observation to distinguish what is made by the needle from the plaited product of the pillow, or even the twisted lace of the machine. Technically, lace consists of two elements: the pattern, flower, or gimp, which forms the closer-worked and more solid portion of the fabric; and the ground or filling, which serves to hold the pattern together and in its proper place. In some varieties of lace the ground is almost entirely wanting, and the pattern holds together by joining at the edges where two portions of the design meet and touch. In other cases the ground consists of ties or brides, thin loops or plaits, passing from the edge of one portion of the pattern to another contiguous, and thus tying them together. More frequently the ground consists of a delicate filmy honeycomb called a "réseau," of which the simplest form is the bobbin-net, now made by machinery. On the "réseau" the pattern is sometimes stitched down after being separately made, such laces being known as "appliqué," or applied. In other cases pattern and "réseau" are formed together by needle or bobbin, or by both. Other technical terms are met with in the description of lace; as "cordonnet," a stout thread or several threads together, employed to outline the pattern; "picot," a minute loop worked on the edge of ties or flowers for their enrichment; and "modes," which are ornamental fillings, variations of the "réseau," which is always a plain honeycomb mesh.

Real or hand-made lace is of two distinct varieties: point or needle lace, which is made with a needle and is, in fact, the direct development of embroidery (being the lace of Italy, Spain and their followers); and pillow lace, which is made by the braiding, plaiting, and knotting of threads whose foundations are pins stuck in a cushion or pillow held on the maker's lap (this is the lace of Flanders and the Netherlands). To these two schools of real laces, in which the finest linen threads are the material, have been added machine lace, which imitates with marvelous closeness the more noticeable characteristics of the precious hand-made treasures, but utilizes cotton and silk and even metal threads, producing such quantities of beautiful web at such moderate cost as to have practically killed the real lace industry. Of late years, however, an attempt has been made to reëstablish the manufacture of fine point-laces on the island of Burano, near Venice. Similarly, efforts have been made to revive the industry in Honiton, and at the present time much is being done to encourage the development of the art in conventual and other establishments in Ireland. JOHN C. ABBOTT.

Lace Bark, the inner bark of *Lagetta lintearia,* one of the Daphnads. The English name is given because the bark, when macerated and stretched laterally, resembles coarse lace, and in Jamaica, where the tree grows, is made into caps, ruffles, etc. The negroes make durable clothing from it, and the white inhabitants utilize it for ropes and cables. In its native country it grows on marly limestone, where there is not a particle of earth to be seen. Also the name given in New Zealand to the genus *Philippodendron.*

Lacedæmon. See SPARTA.

Lacepede (lä-sā-pād'), **Bernard de la Ville, Comte de,** a French naturalist; born in Agen, France, Dec. 26, 1756. He was appointed curator of natural history in the Royal Gardens at Paris in 1785; at the Revolution, Professor of Natural History in the Jardin des Plantes and in the university; senator in 1799; minister of state in 1809; peer of France in 1814. Besides continuing Buffon's "Natural History" at Buffon's own request, he wrote "Natural History of Fishes" (1798–1803); works on the *Cetacea;* "Natural History of Man"; "The Ages of Nature"; and "General History of Europe" (1826). He was likewise a highly accomplished musician, and published "The Poetics of Music" (1785). An edition of his works appeared in 1876. He died of smallpox in Epinay, near St. Denis, Oct. 6, 1825.

Lacerta (lā-sur-tä) ("The Lizard"), one of the eight constellations added to the original ones by Hevelius in his "Introduction to Astronomy" in 1690, or rather one of the eight which have survived, for he added 10 in all. It is not a conspicuous one, the brightest star being of the fourth magnitude. As the constellation was not known in Bayer's time, it has none of his letters attached to any of its stars; but Baily in the B. A. C. assigned the letters α and β to the two stars known by Flamsteed's numbers 7 and 3 respectively, and these will probably stand, though they have not been adopted by astronomers generally.

Lacewing Fly. See GOLDEN EYE FLY.

Lachaise, Francis d'Aix de (lä-shāz'), a French Jesuit; born in Aix, Loire, France, Aug. 25, 1624. He was a provincial of his order when Louis XIV. selected him for his confessor on the death of Father Ferrier in 1675. His position was one of great difficulty, owing to the different parties at the court, and the strife between Jansenists and Jesuits. He sustained among his contemporaries the reputation of a man of

mild, simple, honorable character. Madame de Maintenon could never forgive him the little zeal with which he opposed the reasons urged against the publication of her marriage with the king; but during the 34 years that he filled his office of confessor, he never lost the favor of the king. He was a man of some learning, and fond of antiquarian pursuits. Louis XIV. built him a country-house to the E. of Paris, the large garden of which was, in 1804, converted into a burial-place now known as the Père-la-Chaise, ("Father Lachaise"). He died in Paris, Jan. 20, 1709.

La Chaussée, Pierre Claude Nivelle de (lä shō-sā′), a French dramatist, founder of the so-called "mixed" or "weeping" comedy; born in Paris in 1692. His comedy "The False Antipathy" (1734) was the first French pathetic comedy. Of 18 dramas written by him, among the best are: "Fashionable Prejudice" (1735), directed against the idea, then wide-spread, that a man of rank can have no love for his wife; "School of Friendship" (1737); "Mélanide" (1741); "Love for Love" (1742); "Pamela" (1743); "School of Mothers" (1745); "The Governess" (1747). His plays were all written in verse and followed strictly the rules of the classic drama, but inclined to be somewhat tedious in their moralizing. ("Works," 5 vols. 1762.) He died in Paris, March 14, 1754.

Laches (lash′ez), in English law, a word used to denote negligence or undue delay, such as to disentitle a party to a particular remedy or to relief. According to the common law this principle has no application as regards the crown; but various statutes, chiefly the so-called "Nullum Tempus Act" (9 Geo. III. chap. 16), have restricted the rights in this respect.

Lachesis (lak′e-sis), in classical mythology, one of the three FATES (*q. v.*). Also the name of Planetoid 120. In zoölogy, (1) A genus of *Crotalidæ*. Rattlesnakes or pitvipers. *Lachesis mutus*, the bushmaster of Surinam, Guiana, and Brazil, has the rudiments of a rattle. (2) A doubtful subgenus of mollusks, genus *Pleurotoma*.

Lachine, a town in Jacques Cartier co., Quebec, Canada; on Lake St. Louis, and on the Grand Trunk railroad; 8 miles from Montreal. It is a popular resort for pleasure parties in the winter, and in summer is largely used as a residential place by business men of Montreal. It is best known as the terminus of a canal 9 miles long connecting it with Montreal and built to avoid the Lachine Rapids. All the commerce of Montreal *via* the Great Lakes passes through this canal. Lachine is also the terminus of the Ottawa line of steamers, and daily at noon in summer a steamer of the Royal Mail line leaves the town for Toronto, Hamilton, and Kingston. Pop. (1901) 5,561.

Lachlan (läk′lan), a river of Eastern Australia, rising in New South Wales, to the W. of the Blue Mountains; total length about 700 miles. It is joined by the Murrumbidgee, the united stream afterward falling into the Murray.

Lachmann, Karl (la*h*′män), a German philologist and critic; born in Brunswick, March 4, 1793. With Jakob Grimm he was the founder of the Old-German philology, and was distinguished for the keenness of his critical method. Among the most important of his works were his treatment of the Nibelungen (1836), arguing that it is composed of 20 old folk-songs; "Views on Homer's Iliad" (1847), aiming to show it to be made up of single songs; and his editions of the Nibelungenlied (1826), Walther von der Vogelweide, Wolfram von Eschenbach, Propertius, Catullus, Tibullus, Lucretius, etc. He was professor at Königsberg (1818) and Berlin (1825). He died in Berlin, March 13, 1851.

Lachrymæ Christi, the name of one of the best of the wines grown in Italy, said to be identical with the old Falernian frequently mentioned by Horace. It is of a dark red color, and, some critics say, of exquisite flavor. It is grown at Galitta, in Naples, though much is grown around Vesuvius, which is largely exported.

Lachrymatory (lak′rim-), a fanciful term applied to small glass vessels, in shape like the alabastron, but with a longer neck, and said to be intended for holding tears consecrated to the dead; but their real use was probably to hold perfumes or ointments.

Lackawanna, a river which runs through the N. E. part of Pennsylvania and flows into the Susquehanna at Pittston; length about 50 miles. Great quantities of the best anthracite coal are mined in the valleys adjacent to this river.

Lackey Moth, *Clisiocampa neustria*, a moth of the family *Lasiocampidæ*. The fore wings are either ocher-yellow, with two brown transverse stripes, or brownish-red with transverse yellow ones; the hind wings paler and without stripes. The caterpillars are striped with blue, red, and yellow, living together on trees under a web. The ground lackey, a rarer insect, is *C. castrensis*.

Laclake, in painting, a pigment prepared from lac, of a rich, deep, transparent color, less brilliant and more durable than those extracted from cochineal and kermes, but inferior in both these respects to the color obtained from madder.

Laclos, Pierre Ambroise François Choderlos de (lä-klō), a French novelist;

born in Amiens in 1741. He is best known by his "Dangerous Connections" (1782). He wrote also a satire against Madame Dubarry, "A Letter to Marget." His life was spared by Robespierre, for the reason, so it was said, that he composed Robespierre's speeches for him. He died in Taranto, Italy, Nov. 5, 1803.

La Condamine, Charles Marie de (lä kôn*g*-dä-mēn′), a French scientist; born in Paris, France, Jan. 28, 1701. He is best known as having with Bouger and Godin measured an arc of the meridian on the plain of Quito, Ecuador. The expedition lasted nine years (1735–1744). On his way home he descended the Amazon, being the first scientist to do so, and the first man to publish accurate maps of the river. He is said to have introduced the knowledge of india-rubber into Europe. He wrote: "Journal of an Expedition to the Equator by Order of the King" (1751); "Abridged Account of a Journey Made in the Interior of South America" (1745); "History of Smallpox Inoculation" (1773); etc. He died in Paris, Feb. 4, 1774.

Laconia (-kō′ni-ä), a former name for a tract of country granted by royal patent to Ferdinand Gorges and John Mason. It was bounded by the Merrimac and Kennebec rivers, the ocean, and the so-called River of Canada. The present State of New Hampshire formed a considerable portion of Laconia. The colony was of short duration.

Laconia, a territory in ancient Greece. See SPARTA.

Laconic, a term applied to the style adopted by the Spartans, or Lacedæmonians (whose country was called Laconia), who endeavored to confine themselves to a sententious brevity in speaking and writing.

Laconicum (-kon′-), among the ancients, the semi-circular end of a bath; a circular stove, for the purpose of heating the sudatories, or sweating-rooms of a bath. The use of the dry bath is said to have been prevalent among the Lacedæmonians.

Lacordaire, Jean Baptiste Henri Dominique, one of the greatest of modern pulpit orators; born in Recey-sur-Ource, Côte-d'Or, France, May 12, 1802. He entered the College of Dijon in 1812, and in 1819 began the study of law. Having graduated in law he repaired in 1821 to Paris, where he practised as a probationary advocate. In 1824, to the surprise of those who knew that his theological system was dictated by Voltaire, he entered the Seminary of Saint-Sulpice, with the purpose of devoting himself to the Church, and in 1827 received holy orders. Archbishop de Quélen appointed him almoner of the Visitation, and in 1828 he was made almoner-adjoint to the Collége Henri IV. He distinguished himself greatly as a preacher, and was offered the post of vicar-general by the Bishop of New York. The revolution of 1830 alone prevented him from leaving for the United States. He then formed a close alliance with the Abbé de Lamennais, and in conjunction with him and the Comte de Montalembert founded the democratio-catholic journal "L'Avenir," in which the highest Church principles and extreme radicalism were advocated with great eloquence and ability. On Jan. 31, 1831, Lacordaire and Lamennais were cited before the Cour d'Assises of Paris for two articles that appeared in their journal, and though they made a successful defense, "L'Avenir" was condemned by Gregory XVI., and discontinued in 1832. Lacordaire, resuming his almonership of the Visitation, now devoted himself to the duties of the pulpit, and the freedom and eloquence with which he treated social affairs in his discourses attracted admiring and spellbound audiences. The crowds that flocked to Notre Dame were immense and even the non-religious world was irresistibly attracted by his boldness and eloquence. After several visits to Rome he entered the novitiate of the Dominican Order in 1839 and took the vows in the following year. He added to his Christian name that of the founder, of whom he published a life in 1841, and again appeared in the pulpit of Notre Dame in the habit of a Dominican friar. In the first election after the revolution of 1848 he was chosen the representative in the Constituent Assembly for the department of Bouches-du-Rhône, but after a few weeks he resigned and withdrew from politics. In 1850 the Pope conferred on him the office of provincial of the Dominicans in France, which he held for four years. In 1853, in the Church of Saint-Roch, he preached his last great sermon, in which the recent extensions of the imperial prerogative were handled with much boldness and vigor. His health declining, in 1854 he withdrew from Paris, and accepted the direction of the free college of Sorèze, where he resided till his death, Nov. 22, 1861. In 1860 he was elected into the Académie Française, in succession to De Tocqueville. Of his numerous works his "Lettres à un jeune Homme sur la Vie Chrétienne" (1858 and 1860) have been much admired.

Lacordaire, Jean Theodore, a naturalist; brother of Jean Baptiste Henri; born in Recey-sur-Ource, Côte-d'Or, France, Feb. 1, 1801. He studied law at Dijon, afterward devoting himself to science. From 1825–1832 he made four journeys to South America to collect and study insects. In 1835 he was chosen Professor of Zoölogy, and in 1838 of Comparative Anatomy in the University of Liege, Belgium. He wrote numerous important papers on *Coleoptera* and various articles on South America. He died in Liege July 18, 1870.

Lacoste, Sir Alexander, a Canadian jurist; born in Boucherville, Quebec, Jan. 12, 1842. After a brilliant career at the bar he became a Dominion senator and administrator of Quebec Province (1898-1907).

Lacquering. The industrial use of lac in the extreme Orient dates from a far distant age, and appears to have originated in China. Surpassing in skill those who had imitated them in the art, the Japanese have attained decided superiority. This has been attributed at times to the quality of the material, the trees that nourish the lac-producing insects finding in Japan an exceptionally favorable soil for their development, and again, to the ability of the operatives. But, according to M. Dumontier, it appears, above all, due to the more delicate esthetic taste of the Japanese.

Lac trees are found in Tonking, in Cambodia, in China, and in Japan. The lac of Cambodia produces a transparent polish very much esteemed. It is prepared by processes kept secret, and is sold at high prices. The sap of the old trees seems to be preferred. The *Melanorrhea laccifera*, called by the people of Cambodia *mcreak*, is a large redwood tree, which grows in abundance throughout the country and on the island Phu-Quoc. It produces the most esteemed lac of that region. At the end of four years after planting, it has attained a height of from two to four meters, and is then able to support the incisions which furnish the precious fluid.

At Tonking the lac tree grows in nearly all the mountainous regions, especially in Houghoa, Luyenquan, and Thai-nguyen. It is a shrub, which, according to Balauta, is from three to four meters high; its slender trunk is erect; its polygamous flowers are greenish white, and the leaves are imparipinnate. The wild species is very similar to the cultivated, and is found in woody places on the Black river. The tree is vigorous in growth, flourishes in all soils, and accommodates itself even to rocky places, unsuitable for other cultivation. Though doubt prevails as to the scientific determination of the nature of the lac tree of Tonking, Balauta believes that he can identify it with the *Rhus succedanæ* of Linnæus. The seeds are gathered in October, and the natives soak them for three or four days in water, the germination usually commencing in about 48 hours. In China the lac tree occupies a very extended geographical area, stretching from the mountains of Tche-Kiang to the extremity of the empire. The centers of production are Hou-Pe, Chen-Si, and Gse-Lchonen in the W. The lac most esteemed by the Chinese comes from the *Terminalia vernicia*. It is in the provinces of the North of Japan that the *Rhus vernicifera*, or lac tree of that country, is abundant. It is vigorous and grows to a height of 12 meters. Its bark is whitish, and its imparipinnate leaves are two or three times as large as those of the Tonking shrub. The quality of the sap improves with the age of the tree; it is harvested in April and October.

The art of lacquering includes various steps, which are divulged as little as possible; without them nothing but a varnish of good quality would be realized. Thus in Tonking where the abundant production is the object of an important trade with the Chinese, it is so used only for varnishing, while in China the same product from the same sources contributes to most artistic applications. When the Annamites propose to lacquer an object, a box, for example, they first stop up the holes and crevices, covering all the imperfections with a coating of diluted lac by means of a flat, close, short brush. Then they cover the whole with a thick coating of lac and white clay. This clay, oily to the touch, is found at the bottom of certain lakes in Tonking; it is dried, pulverized and sifted with a piece of fine silk before being embodied with the lac. This operation is designed to conceal the inequalities of the wood and produce a uniform surface, which, when completely dry, is rendered smooth with pumice stone. If the object has portions cut or sunk the clayey mixture is not applied, for it would make the details clammy, but in its place a single, uniform layer of pure lac. In any case, after the pumicing, a third coating, now pure lac, is passed over the piece which at this time has a mouse-gray color. This layer, known under the name of *sou lot*, colors the piece a brilliant black. As the lac possesses the remarkable property of not drying in dry air, the object is left in a damp place. When perfectly dried the piece is varnished and the desired color imparted by a single operation. If the metallic applications are excepted, the lac is colored only black, brown, or red.

The following formulas are in use:

Black.—One part of turpentine is warmed for 20 minutes beyond the fusing point; then poured into three parts of lac; at the same time *pheu deu* (copperas) is added. The mixture is stirred for at least a day, sometimes more, by means of the *cai vay*, a large paddle.

Maroon.—This is prepared by a process similar to the preceding, replacing half of the copperas by an equal quantity of China vermilion.

Red.—The lac, previously stirred for six hours, is mixed with hot oil of *trau*, and the whole is stirred for a day, after which vermilion is added. The latter should be of good quality, so as to have it brilliant and unchangeable.

The operation of lacquering is then ended, but there are parts to be gilded. These are again covered with a mixture of lac

and oil of *trau*. When this layer is dry the metallic leaves are applied, which are themselves protected by a coating composed also of lac and oil of *trau*. All these lac and oil of *trau* mixtures are carefully filtered, which the natives effect by pressing the liquid on a double filtering surface formed of wadding and of a tissue on which it rests. It can only be applied after several months when the metallic leaf is of gold. In the case of silver or tin the protecting coat can be laid on in a few days. It favorably modifies the white tints of these two metals by communicating a golden color. The hue, at first reddish, gradually improves and acquires its full brilliancy in a few months.

Little information is procurable concerning the processes employed by the Chinese and Japanese. The wood to be lacquered should be absolutely dry. It receives successive applications, of which the number is not less than 33 for perfect work. When the lac coating attains the thickness of a half centimeter it is ready for the engravers. The Chinese, like the inhabitants of Tonking, make use of oil of *trau* to mix with the lac, or oil of *aleurites*, and the greatest care is exercised in the drying of the different layers. The operation is conducted in dim-lighted rooms specially fitted up for the purpose; the moisture is maintained to a suitable extent by systematically watering the earth, which covers the walls of this "cold stove."

In Japan when wood is well prepared and the faults have been corrected with pure lac it is dried, pumiced and covered with a coat composed of crushed flax mixed with glue. Then a layer of lac is applied and covered with a fine linen fabric which should perfectly adhere in all its parts. This first preparation, suitably dried, serves as a foundation for the successive applications of 33 layers. Each coating is rubbed with a fine-grained stone before drying in the moist chamber. This is done with the greatest precaution, so as to avoid impurities and dust. The last polish is obtained by rubbing with the powder of calcined deer horn. The piece is then ready to receive the application of gold or of silver, which is effected as follows:

The design to be reproduced is drawn on very fine paper prepared with a mixture of glue and alum, and on the back of the paper the outlines are traced with a brush of fine rats' hair, dipped in lac previously boiled over a brisk charcoal fire. This paper is then applied to the object to be decorated, and it is made to adhere by rubbing with a spatula, either of minoki wood or of whalebone. When the paper is removed the design is found transferred damp and is rendered more distinct by the application of a white powder by means of a piece of wadding. With one of these transfer papers 20 reproductions can be secured, and the lines can be retraced with the boiled lac, it is said, so as to procure copies almost indefinitely. The outlines remain damp in consequence of the use of the boiled lac, and imperfections can be corrected. In this case the outlines are retraced with a pencil of hare's hair lightly charged with a preparation of lac not boiled. This operation is delicate and requires great care not to displace the lac from the original outlines. When ended the whole is covered with fine gold, silver, or tin powder, as desired; the powder is applied by means of a piece of wadding. If the object to be decorated is of large dimensions the process is conducted on separate parts, and at each step the piece is placed in a damp closet tightly closed, so as to exclude the dust. When the metallic coating has hardened sufficiently the piece is taken out, and the design is covered with a fine transparent lac laid on with a brush of hare's hair. The gilding or silvering of the succeeding part is never attempted until the preceding has been completely dried in the damp chamber. All the parts of the object are finally rubbed with a piece of camelia wood charcoal in order to equalize the thickness, and then polished with the fingers moistened with a mixture of calcined deer horn powder and oil. Independently of its use in the arts, lac is susceptible of various industrial applications. It serves notably in mixture with oils for the production of the most esteemed varnishes. For some years the attention of the scientific and industrial classes of Europe has been particularly attracted by this remarkable product, which can be furnished readily and abundantly by many localities. Perhaps the day is not distant when it will become a profitable source of income.

Lacretelle, Jean Charles Dominique de (lö-kru-tel′), a French journalist and historian; born in Metz, Sept. 3, 1766. He was attracted to Paris on the outbreak of the Revolution; but there, instead of following his profession of advocate, he helped to edit "Le Journal des Débats" and "Le Journal de Paris." He managed to escape the Reign of Terror by enlisting in the army; but soon procured his release and returned to journalistic work in the capital. In 1810 he was nominated censor of the press, having the year previous been appointed Professor of History in the University of Paris. This post he held to 1853. From 1811 a member of the French Academy, he became its president in 1816. He wrote "History of the Eighteenth Century" (1808); "Historical Summary of the Revolution" (1801–1806); "History of France during the Religious Wars" (1814–1816). He died near Mâcon, France, March 26 1855.

Lacroix, Jules (lä-krwä′), a French poet, dramatist, and novelist; brother of P. Lacroix; born in Paris, May 7, 1809. He wrote numerous romances; a volume of poetry, "Les Pervenches" (The Periwinkles: 1838); several dramas; and "The Year of Infamy" (1872), a collection of patriotic poems. He died Nov. 10, 1887.

Lacroix, Paul, pseudonym P. L. JACOB, BIBLIOPHILE, a French miscellaneous writer; born in Paris, France, Feb. 27, 1806. His industry was prodigious, and the number of works that issued from his pen immense. Besides actively assisting in more than one journalistic enterprise, he wrote romances, plays, books on history, manners and customs, and bibliography, and edited memoirs, biographies, etc. His most valuable productions were a series of works on the habits, manners, customs, costumes, arts, sciences, and intellectual condition of France from the Middle Ages down to the 19th century. His bibliographical works are also valuable, especially those in connection with Molière. He wrote two elaborate works on the "History of Prostitution," published under the name of Pierre Dufour. From 1855 onward Lacroix was custodian of the Arsenal library of Paris, and died in that city Oct. 16, 1884.

La Crosse, city and county-seat of La Crosse co., Wis., on the Mississippi river and the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern and several other railroads; 18 miles S. E. of Winona. It is the farming, manufacturing and dairying trade center for Western Wisconsin, Southern Minnesota, and Northern Iowa, having a population of 600,000, and yielding an annual trade of $2,560,000; and has manufactories of agricultural implements, and lumber, shingle, and lath mills. The city contains the Asylum for Chronic Insane, St. Francis and United States Marine Hospitals, and Washburn Public Library; and has electric light and street railroad plants, National and other banks, over 50 churches, daily, weekly and monthly periodicals; and an assessed property valuation of about $12,000,000. Pop. (1890) 25,090; (1900) 28,895; (1910) 30,417.

Lacrosse (läkros), a Canadian field game played with a ball and a long stick (five or six feet) of light hickory, bent at the top like a bishop's crozier (French *crosse*). Strings of deer-skin are stretched diagonally across the hooked portion of the crosse in different directions, forming a network — not so tightly as in a battledore or tennis racquet, nor so loosely as to form a bag. Only one ball is employed, made of india-rubber, and eight or nine inches in circumference. Posts or poles about six feet high, with a small flag at the top of each, complete the equipment. The players are usually 12 on each side, but their number, as well as the distance of the goals apart, is nearly optional. The object of the game is for one side to drive the ball through their opponents' goal. The ball must not be touched with the hand or foot, but is scooped up from the ground with the bent end of the crosse, on which it is carried horizontally, while the player runs toward one of the goals, trying to dodge his antagonists. If it seems prudent, he pitches the ball off his crosse toward one of his own side who may be in a better position to carry it toward the goal. The players must not strike, trip up, or grasp one another, nor must anyone lay hold of the crosse of another; a player may strike the ball off an opponent's crosse with his own crosse, and not by any other means.

The National Lacrosse Association of Canada was founded in 1867, and in the same year an Indian team visited Great Britain. Afterward other Canadian teams played in England and Scotland, and several local clubs were formed; in a few places the game is very popular. It is played also in the United States.

Lactantius, Firmianus (lak-tan′shi-us fur-mi-ā′nus), **Lucius Cælius,** or **Cæcilius,** an eminent father of the Church, lived at the beginning of the 4th century. He was by some esteemed an African and by others a native of Fremo, in Ancona. He studied rhetoric under Arnobius, and by his "Symposium" he obtained such renown that Diocletian appointed him to teach rhetoric in Nicomedia. Subsequently he was appointed tutor to Crispus, the son of Constantine, who dying not long after, Lactantius was neglected. He wrote many works in vindication of Christianity, from the style of which he has been honored with the name of the "Christian Cicero." His principal work is the "Divine Institutions," in seven books.

Lacteals, an anatomical term. The lacteals received the name of *vasa lactea* in 1622 from Asellius, their discoverer. From the specific word *lactea,* given to distinguish vessels of this class, came the word lacteal. The lacteals and lymphatics properly constitute one system of vessels which convey a fluid or fluids from various organs of the body to the veins near their terminations in the heart. The fluid which these vessels convey is milky after a full meal, and called chyle, though, during intervals of fasting, it is a yellowish lymph, as in the lymphatics. The lacteal vessels commence on the surface of the intestines, and unite with one another in the mesentery, and after leaving the mesentric glands discharge their contents for the nourishment of the body into the *receptaculum chyli,* in front of the second lumbar vertebra.

Lactic Acid, in chemistry, $C_3H_6O_3 = CH_3 \cdot CH \cdot (OH) \cdot CO \cdot OH$, a monobasic, diato-

mic acid, discovered by Scheele in sour milk, and first recognized as a distinct acid by Berzelius. It occurs in small quantity in the animal organism, especially in the gastric juice, and, under certain circumstances, is formed in the fermentation of some sugars. It is readily prepared by adding to a solution of grape sugar a small quantity of powdered old cheese, mixed with sour milk, and allowing the mixture to stand for 8 or 10 days at a temperature of 40° to 45°. It may also be prepared synthetically by mixing ethylidene oxide or acetic aldehyde with hydrocyanic acid, and treating the resulting product with hydrochloric acid, the ethylidene hydrate cyanide first formed being converted into lactic acid even at the ordinary temperature. It is a colorless, inodorous liquid of syrupy consistence, possessing an intensely sour taste. It is soluble in all proportions in water and alcohol, slightly soluble in ether. Its sp. gr. is 1.25 at 20°, and it does not solidify even at −24°. When boiled with nitric acid it is converted into oxalic acid, while hydrocyanic acid reduces it to propionic acid. Lactic acid forms salts by the replacement of hydroxylic hydrogen by metals. The neutral alkali salts are deliquescent, soluble in alcohol. Sodic lactate, $CH_3 \cdot CH(OH)CO \cdot ONa$, crystallizes in fine hair-like crystals. Calcic lactate $(CH_3 \cdot CH(OH)CO \cdot O)_2Ca \cdot 5H_2O$, crystallizes in small, thin needles, soluble in water and alcohol. Zincic lactate, $C_6H_{10}ZnO_6 3H_2O$, is the most characteristic salt of lactic acid. It crystallizes in colorless, monoclinic prisms, slightly soluble in cold water, very soluble in boiling water, but insoluble in alcohol.

Lactic Ethers. Lactic Acid (*q. v.*) is capable of forming three different ethers containing the same monatomic alcohol-radical — viz., ethylic lactate, monethylic lactate, and diethylic lactate, the first two being isomeric. Ethylic lactate, $CH_3 \cdot CH \cdot (OH) \cdot CO \cdot O \cdot C_2H_5$, is formed by heating to 170°, in a sealed tube, a mixture of lactic acid and alcohol. It is a colorless liquid of peculiar odor and boils at 186°. Water, alcohol, and ether dissolve it in all proportions, but it is difficult to obtain it in the crystalline form. Monethylic lactate is a colorless liquid, boiling at 150°. It is soluble in water, alcohol, and ether. Diethylic lactate, $C_7H_{14}O_3$, produced by the action of ethylate of sodium on chloropropionate of ethyl, is a transparent, mobile liquid of an agreeable odor, insoluble in water, but soluble in alcohol and ether. It boils at 156.5°, and has a sp. gr. of 0.9203 at 0°.

Lactic Ferment, a minute organism which, under the microscope, is seen to consist of small elliptical cells, generally detached, but sometimes occurring in chains of two or three. It is developed in milk when it is allowed to stand for some time, and is the cause of the milk becoming sour, the sugar of the milk changing into lactic acid. It is also developed when cheese is added to a solution of sugar, and kept at a temperature of 35° to 40°.

Lactometer (-tom′-), or **Galactometer,** a species of hydrometer, graduated to show the comparative specific gravity and consequent value of different samples of milk. The instrument is a good evidence of the specific gravity of milk, and the specific gravity is a probable, but not positive, evidence of quality. Taken in connection with the per-cent. glass, which measures the per cent. of cream that rises, it is nearly a positive indicator of pure and watered milk. One form of the lactometer for ascertaining the amount of cream in milk consists of a tube with a funnel mouth for convenience in charging it, and having the upper portion graduated. The tube is about a foot in length, and, being filled, the cream is allowed to rise when its richness is determined by the number of graduated spaces occupied by the cream.

Lactoscope, an instrument, invented by Donne of Paris, for assisting in determining the quality of milk by ascertaining its relative opacity.

Lactose, in chemistry, $C_6H_{12}O_6$, a sugar, isomeric with dextrose, formed from milk sugar by treatment with ferments or dilute acids. It crystallizes in leafy and warty crystals, soluble in water, sparingly soluble in cold alcohol, and crystallizing more readily than ordinary glucose. It has a greater dextro-rotary power than dextrose, and reduces alkaline cupric salts to cuprous oxide. It resembles dextrose in most of its reactions, but is distinguished from it by giving no compound with sodic chloride, and by yielding lactonic and mucic acids instead of saccharic acid when oxidized by nitric acid. Lactose is the first aldehyde of dulcite.

Lactucarium (-kā′-), the brown viscid juice of the common garden lettuce, obtained by incision from the leaves and flowering stems, and dried in the air. It is a mixture of various substances, including lactucone, lactucin, lactucic acid, mannite, albumin, etc. Lactucarium is hypnotic, antispasmodic, and sedative, and has been recommended in cases in which opium is inadmissible, particularly for children. It has been administered with advantage in chronic rheumatism, diarrhœa, and asthma, in doses of two to five grains.

Lacuna (lā-kū′nä), plural **Lacunæ** (-nē), in human anatomy, open spaces, prolonged into canaliculi or delicate tubes finer than the smallest capillary vessels, occurring in bone. The lacunæ have an aver-

age length of 1-1800 of an inch, and are about half as wide and a third as thick. They contain a minute granular substance found by Professor Goodsir to be a germinal spot of nutritive center. Comparative anatomy: Spaces among the tissues in some of the lower animals, serving in place of vessels for the circulation of the fluids of the body. In botany, (1) Singular, Link's name for an air-cell in a plant. (2) Plural, Small hollows or pits upon the under surface of the thallus in a lichen. In zoölogy, a genus of *Littorinidæ*. Sixteen recent species are known and one fossil, the former from Norway, Great Britain, Spain, etc., the latter from the Scotch glacial beds.

Lacunar (-kū′-), in architecture, (1) A term applied to the panels in a ceiling which are produced by a series of sunken compartments, originating in the rafters which support an upper story, and were exposed to the eye, leaving sunk spaces (lacunæ) between the intersections as they crossed each other, and which were afterward retained as a means of breaking the unsightly flatness of a ceiling. The edges of these panels were decorated with carved and gilt ornaments, and the centers filled in with decorative painting. (2) The ceiling or under surface of the member of an order, of the corona of a cornice, or of the part of the architrave between the capitals of columns, and generally any ceiling having sunk or hollowed compartments without spaces or bands between the panels; a laquear having bands between the panels.

Lacus Benacus. See GARDA.

Lacus Verbanus. See MAGGIORE, LAGO.

L'Acuto. See HAWKWOOD, SIR JOHN.

Ladanum (lad′-), in chemistry, $C_{20}H_{30}O_3$; labdanum, an odorous, resinous substance which exudes in drops from the leaves and twigs of the *Cistus creticus*, a shrub growing in the island of Candia and in Syria. It is a dark-colored, tenacious resin, somewhat moist, exhaling an odor like that of ambergris. It was formerly much used for making stimulating plasters. Genuine ladanum contains 85 per cent. of resin, 7 per cent. of wax, a volatile oil, and not more than 6 per cent of earthy matter and hairs. It is often adulterated with black sand. Ladanum in sticks is prepared in Portugal, Spain, and the S. of France by boiling the leaves and branches of *Cystus ladaniferus*.

Ladas, Alexander's messenger, noted for his swiftness of foot.

Ladd, George Trumbull, an American educator; born in Painesville, O., Jan. 19, 1842. He was educated at Western Reserve College and Andover Theological Seminary; was pastor of Spring Street Congregational Church, Milwaukee, Wis., in 1871–1879; and Professor of Philosophy at Bowdoin College in 1879–1881, when he assumed the chair of philosophy at Yale. His works include: "Principles of Church Polity" (1881); "Doctrine of Sacred Scripture" (1883); "Elements of Physiological Psychology" (1887); "Introduction to Philosophy" (1889); "Psychology" (1894); "Philosophy of Knowledge" (1897); "Essays on the Higher Education" (1899); "Rare Days in Japan" (1910); etc. He lectured on philosophy in India 1899-1900, and was decorated by the Emperor of Japan.

Ladies' Mile, The, a portion of the famous driveway and promenade in Hyde Park, London, known as Rotten Row.

Ladies' Peace, the popular name of the treaty concluded in Cambray, France, in August, 1529, by the mother of Francis I. and the aunt of Charles V.

Ladislas, the name of six Kings of Hungary: LADISLAUS I., King of Hungary; born in 1041, succeeded in 1079; died in 1095, and was canonized for his piety by Celestin III., 1198. LADISLAS II., called the Infant, succeeded and died the same year, 1200. LADISLAS III. succeeded 1272, assassinated, after a life of debauchery and a disgraceful reign, 1290. LADISLAS IV., the same as Uladislas V., King of Poland. succeeded his father in the latter dignity, 1435, and was elected by the Hungarians, 1440, killed in battle by the Sultan Amurath, 1444. LADISLAS V. succeeded in the 5th year of his age, 1444, and died suddenly, 1458. LADISLAS VI., son of Casimir IV., King of Poland, and called, according to the Polish form of his name, Uladislas II., became King of Bohemia 1471, and King of Hungary 1490. Died in 1516.

Ladislas, Ladislaus, or **Lancelot,** King of Naples, called the Liberal and Victorious; born in 1376. He succeeded his father, Charles Duras, in 1386. He was previously Count of Provence and King of Hungary. He obtained the latter crown in 1403 during the imprisonment of Sigismund, who compelled him to return to Italy. On the death of his father he was opposed by Louis II., Duke of Anjou, which occasioned some bloody wars. Pope John XXIII. at first espoused the cause of Louis, but afterward took the part of Ladislaus, who, however,

LADISLAUS, KING OF NAPLES.

marched against Rome, and having taken it, turned his arms on the Florentines, whom he compelled to sue for peace, in 1413. He died in Naples, it is suspected of poison, in 1414.

Ladislas, Syrokomla. See KONDRATOVICZ, VLADISLAV.

Ladoga (lä-dō′gä) **Lake,** the largest lake of Europe; a short distance N. of St. Petersburg, in Russia, being crossed by the frontier line between that country and Finland; 129 miles in length, 78 in breadth; area, 6,998 square miles. The S. and E. shores are low and marshy; but on the N. W. the coast is broken, and rises into cliffs. There, too, are numerous islands. The lake receives the waters of Lake Onega and Lake Ilmen in Russia and of Lake Saima and other lakes in Finland; and its own waters are carried off to the Gulf of Finland by the NEVA (*q. v.*). The average depth does not exceed 300 feet, except in the N. W., where over a limited area the depth is about 730 feet. The navigation is exceedingly dangerous owing to the shallows, sandbanks, and sunken rocks with which the lake abounds, and to the wind and gales which prevail during the months it is free from ice (May–October). In order to obviate the difficulties of navigation, canals have been constructed to connect the mouths of the rivers that reach it along the S. and S. E. shores. The principal is the Ladoga canal (70 miles long and 60 feet wide). This canal system forms the thoroughfare for a very extensive traffic (about 20,000 vessels annually, carrying merchandise valued at $30,000,000) between the Volga and the Baltic. Communication by water subsists between Lake Ladoga and the White Sea as well as the Caspian. The fauna of the lake is arctic in character. Two of the islands in the N. W., Valaam and Konevetz, are each the seat of a monastery, founded in 960 and 1393 respectively, which are visited by thousands of pilgrims every year.

Ladrones (la-drōnz′), or **Marianne Islands,** a chain of 17 islands in the North Pacific, E. of the Philippines and the Caroline Islands; area, about 500 square miles. They were discovered by Magellan in 1521, who gave them the name of "Ladrones," it is said, from the character of their inhabitants, the word meaning "thieves." GUAM (*q. v.*) is the principal island and embraces nearly one-half of the entire area of the group. On June 20, 1898, Captain Glass, of the United States cruiser "Charleston" took possession of the islands in the name of the United States, and by the peace treaty signed at Paris, Dec. 18, 1898, it was provided that the island of Guam should be ceded to the United States. The remainder of the islands, together with the Carolines, passed from the possession of Spain into that of Germany, Oct. 1, 1899, in consideration of the payment of about $4,187,500.

Lady, in zoölogy, the calcareous apparatus in the cardiac part of the stomach of the lobster, the function of which is the trituration of the food. Also, in the plural, in slating, a size of slates 15x18 inches.

Lady Altar, the altar of a chapel dedicated to the Virgin Mary. In the majority of English cathedrals it is situated behind the high altar. In English parish churches, and in Roman churches it is usually in the chancel or in one of the aisles.

Lady Arabella. See ARABELLA STUART.

Ladybird (*Coccinella*), a genus of pretty little beetles, generally of a brilliant red or yellow color, with black, red, white, or yellow spots. The form is nearly hemispherical, the under surface flat, the thorax and head small, the antennæ and legs short. When handled they emit a yellowish fluid with a disagreeable smell. Adults and larvæ feed chiefly on aphides, and are thus most useful to hop-growers and other agriculturists. The eggs are laid under the leaves of plants, on which the larvæ afterward run about in pursuit of aphides. In late autumn the surviving adults find safe corners and hibernate till spring. Ladybirds occasionally occur in immense numbers, and from ignorance of their usefulness have sometimes been regarded with superstitious dread. The family of which the genus is type, *Coccinellidæ,* includes about 1,500 species, of which about 40 are British. One of the commonest forms (*C. septempunctata*) is found over all Europe and in parts of Asia and Africa. The name is apparently a modification of "ladybug," lady referring to the Virgin Mary, as the German name *Marienkäfer* suggests.

Lady Chapel, a chapel dedicated to the Virgin Mary, frequently attached to a large church. In churches built before 1200 the lady chapel was usually an independent or additional building.

Lady Day, one of the regular quarter days in England and Ireland, on which rent is generally made payable. It is March 25 in each year; but in some districts Old Lady Day (April 6) is still observed as the term day.

Lady Day in Harvest, the Feast of the Assumption of the Virgin Mary, Aug. 15.

Lady Fern, *Nephrodium thelypteris,* a species with lanceolate, pinnate fronds, the pinnæ again deeply pinnatifid. Also *Athyrium filix fœmina,* a beautiful fern with large, membranous, oblong, lanceolate, twice or thrice pinnate fronds, with close-set pinnules.

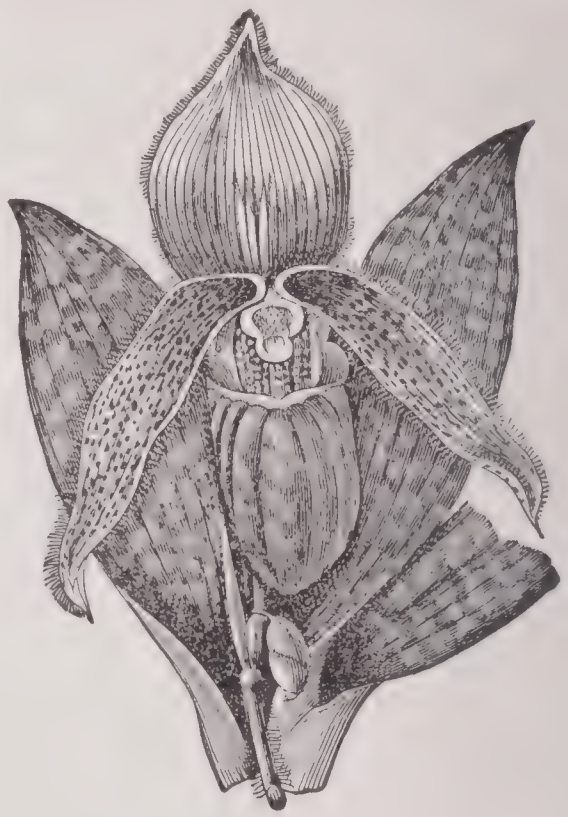
Lady Harriet. See ACLAND, LADY CHRISTIAN HENRIETTA CAROLINE.

Lady's Comb, *Scandix pecten-veneris*, a branching, pubescent, umbelliferous plant, with oblong twice or thrice pinnate leaves, terminal and lateral; umbels of very irregular flowers, the fruit very slender, scabrid. Perhaps only a colonist where it occurs in cornfields in Great Britain, wild in Continental Europe, South Africa, West Asia to Northwestern India. Called also Venus's comb.

Lady's Mantle (*Alchemilla*), a genus of herbaceous plants, chiefly natives of temperate and cold climates, of the natural order *Rosaceæ*, sub-order *Sanguisorbeæ*; having small and numerous flowers and eight-cleft calyx, no corolla, and the fruit surrounded by the persistent calyx. The name lady s mantle, signifying "Mantle of Our Lady" — *i. e.*, of the Virgin Mary — is derived from the form of the leaves. The common lady's mantle (*A. vulgaris*) is abundant on banks and in pastures throughout Great Britain. Its root-leaves are large, plaited, many-lobed, and serrated; its flowers, in corymbose terminal clusters, are usually of a yellowish-green color. Still more beautiful is the Alpine lady's mantle (*A. alpina*), which grows on mountains in Scotland and has digitate serrated leaves, white and satiny beneath. A common British plant of very humble growth and unpretending appearance is the field lady's mantle, or parsley piert (*A.*— or *Aphanes* — *arvensis*), found in pastures, an astringent and diuretic, said to be sometimes useful in cases of stone in the bladder, by producing a large secretion of lithic acid.

Ladysmith, a town in Natal, 180 miles from Durban. It has no commercial importance but is of strategic value as a military base. It was named after the wife of Sir Henry Smith, once governor of Cape Colony. During the Zulu war it was a British military station and in 1880 played an important part in the Boer war. Again in 1899–1900 it was a center of military operations, a siege by the Boers being gallantly withstood by a British garrison under General White. See BOERS.

Lady's Slipper (*Cypripedium*), a genus of plants of the natural order *Orchideæ*, of which one species, *C. Calceolus*, is a native of Great Britain, being found in a few places in the N. of England, and is reckoned one of the most beautiful of the British orchids. The genus is remarkable for the large inflated lip of the corolla. Several very beautiful species are natives of the colder parts of North America. Many tropical and subtropical species and also garden hybrids of these are engrossing subjects of interest to British, continental, and American connoisseurs in choice and rare orchids, who vie with each other for the possession of the most unique and valuable specimens. *C. spectabilis* is a North American species;



LADY'S SLIPPER.

C. barbatum, a native of Java. Both are in cultivation, the former in hardy collections, the latter in hothouses.

Lady's Smock. See CUCKOO FLOWER.

Laeken (lä′ken), a N. suburb of Brussels. In it is the crypt of the Belgian royal family in the new Gothic Church of the Virgin, and a royal palace (built in 1782) which previous to its destruction by fire, Jan. 1, 1890, contained valuable works of art and historical documents. The palace has been rebuilt in the same style as the one destroyed. Pop. about 25,000.

Lælaps, a large fossil dinosaurian reptile found in the Cretaceous formation of the United States.

Lælius, Caius (lē′li-us), a Roman companion-in-arms of Scipio Africanus, consul 190 B. C. His son, of the same name, surnamed "The Wise," distinguished as an orator and man of letters, was consul 140 B. C.

Laennec, René Théodore Hyacinthe (le-nek′), a distinguished French physician; born in Quimper, Lower Brittany, France, Feb. 17, 1781. He studied medicine under his uncle at Nantes, and at Paris under Corvisart. In 1799 he was an army doctor in the field; in 1814 became chief editor of the "Journal of Medicine"; in 1816 chief physician to the Hospital Necker, where he soon after made the discovery of "mediate" auscultation, *i. e.*, of the use of the STETHOSCOPE (*q. v.*). In 1819 he published his "Treatise on Medi-

ate Auscultation," which has undoubtedly produced a greater effect, in so far as the advance of diagnosis is concerned, than any other single book. His treatise had not long appeared when indications of consumption were discovered in his own chest by means of the art of his own invention, and after a few years of delicate health, during which he continued to practise in Paris, he retired to die in his native province, Aug. 13, 1826.

Laertes (lā-ur'tēz), according to Homer, a King of Ithaca, and the supposed father of Ulysses, whose real progenitor was Sisyphus. Laertes, however, resigned his crown to Ulysses when old enough to bear the responsibilities of office, and, retiring to a farm, enjoyed himself in the innocent pleasures of a rural life. After the absence of his son for 10 years at the siege of Troy, and 10 more expended in his return journey, Ulysses found his old and infirm father still employed in his fields and garden; and, having cautiously made himself known to the old king, they repaired together to the palace of the faithful Penelope, where, expelling the host of visitors, they discovered themselves to the delighted queen. Laertes in his youth had been one of the Argonauts.

Læstrygones (les-trig'ō-nēz), a fabled nation mentioned in Homer. They were giants who fed on human flesh and gave themselves up to evil doing.

Laet, Jan Jakob de (lät), pseudonym JOHAN ALFRIED, a Flemish poet, novelist, and journalist; born in Antwerp, Dec. 13, 1815. He was a physician. After championing Flemish rights and language in several journals, some of them founded for the purpose by himself, he deserted journalism for business, but engaged afterward in politics. Among his best-known works were the romance "The House of Wesenbeke" (1842); the village tale "The Player" (1846); "Poems" (1848; 2d ed. 1883). He died in Antwerp, April 22, 1891.

Lætare (lē-tā'rē) **Sunday,** in the Roman Catholic Church, the 4th Sunday in Lent, called also Mid-Lent. It is so named from the first word of the Introit of the mass, which is from Isaiah lxvi: 10. From this name the characteristic of the services of the day is joyousness, and the music of the organ, which throughout the rest of Lent is suspended, is on this day resumed. The lætare medal is a prize conferred on Roman Catholics who have won it by merit and blameless character.

Lævulin (lev'ū-lin), a sweet substance, resembling dextrin, extracted from the juice of tubers of the Jerusalem artichoke by repeated treatment with alcohol. It is soluble in water; does not reduce alkaline cupric salts, and is optically inactive till boiled with hydrochloric acid, when it becomes strongly lævorotatory.

Lævulose (lev'ū-lōs), in chemistry, $C_6H_{12}O_6$, lævo-glucose, or sucro-lævulose, a variety of sugar, isomeric with dextrose, occurring together with dextrose in honey and in the juices of sweet fruits. It is also produced, together with an equal weight of dextrose, by the action of dilute acids, diastase, or yeast, on cane-sugar; or it may be obtained pure by heating inuline with dilute acids. It is a colorless, uncrystallizable syrup, or, when dried at 100°, a gummy, deliquescent mass, soluble in water, and in spirit 50 o. p., but insoluble in absolute alcohol. It closely resembles dextrose in many of its characters, but its aqueous solution is sweeter, and it is more easily altered by heat and acids. Its specific rotatory power is −98°, at 15° for the D line, decreasing with rise of temperature. When powdered slaked lime is added gradually to a solution of lævulose in ice-cold water, calcium lævulosate, $C_6H_{12}O_6 \cdot CaO,H_2O$, soluble with difficulty, is formed. By means of this reaction lævulose can be readily freed from dextrose; the latter, on similar treatment, yielding a freely-soluble compound.

La Farge, John (lä färj), an American artist; born in New York city, March 31, 1835. He studied under Couture in Paris, and with William M. Hunt; became a National Academician in 1869; and a member of the Society of American Artists in 1877. He executed remarkable paintings, altar pieces, and decorations of interiors — notably of Trinity Church, Boston; and designed stained-glass windows for churches and many other buildings, in the new American manner, which is a revival of the art of making colored glass (instead of painting glass), of which he was the originator in association with Louis Tiffany. He was the designer of the "battle window" in Memorial Hall, Harvard University. In 1869 he was made president of the Society of American Artists. He published a volume of "Lectures on Art," and "An Artist's Letters from Japan." He died Nov. 14, 1910.

La Farina, Giuseppe (lä fä-rē'nä), an Italian historian; born in Messina, July 20, 1815. A democratic leader, favoring Italian unity and independence, he lived part of his life as a political refugee; but played an important part in the movements of his time. His principal work was "History of Italy Narrated to the Italian People" (10 vols. 1846). He died in Florence, Italy, Sept. 5, 1863.

Lafayette, a city and county-seat of Tippecanoe co., Ind., on the Wabash river, and the Cleveland, Cincinnati, Chicago, and

St. Louis, the Lake Erie and Western, and other railroads; 64 miles N. W. of Indianapolis. It is the farming and manufacturing trade center for the surrounding country; has boot and shoe factories, car works, flour and woolen mills, marble works, etc.; and is the seat of Purdue University and the State Agricultural College. The city contains a high school, public library, several National banks; has electric light and street railroad plants, waterworks; and an assessed property valuation of nearly $12,000,000. In the public square is an artesian well of sulphur. Pop. (1890) 16,243; (1910) 20,081.

La Fayette (lä fā-yet'), **Madame de,** the reformer of French romance-writing; born in Paris, France, March 16, 1634. Her father was a marshal and governor of Havre. She married the Comte de La Fayette in 1655, and was a member in her youth of the literary circle which met in the Hôtel de Rambouillet. She was the intimate friend of Mme. de Sévigné, and in her 33rd year formed a liaison with La Rochefoucauld which lasted till his death in 1680. Her novels "Zaïde" and the "Princess of Clèves" led to a reaction in taste against the fantastic and long-winded romances of such writers as La Calprenede and Mlle de Scudéry. She had a genuine command of passion and knowledge of character, and in her "Princess of Clèves" gave a vivid and faithful picture of the court-life of her day. A new edition of her "Complete Works" appeared in 1882; the best edition of her "Memoirs" is that of M. Asse (1890). She died in Paris in May, 1693.

MADAME DE LA FAYETTE.

Lafayette, Marie Jean Paul Roch Yves Gilbert Motier, Marquis de, a famous French military officer and statesman; born in the castle of Chavagnac, Auvergne, France, Sept. 6, 1757. He belonged to an ancient family; came to his estates at 13; married three years later; entered the army, and sailed, in spite of the opposition of the court, for America in 1777, to offer his sword to the colonists in their struggle for independence. He became an intimate and admiring friend of Washington, who gave him the command of a division after his conduct at the battle of Brandywine. The treaty between the insurgents and France at once led to war between France and England, and Lafayette returned to his country early in 1779. Six months later he again crossed the Atlantic, was charged with the defense of Virginia, and had his share in the battle of Yorktown, which practically closed the war. On a third visit to North America in 1784, after the conclusion of peace, he was received in such a manner that his tour was a continual triumph.

Lafayette had imbibed liberal principles in the freer air of America, and was eager for reforms in his native country. He was called to the Assembly of Notables in 1787, and sat in its successor, the Assembly of the States General, and in that which grew out of it, the famous National Assembly of 1789. He took a prominent part in its proceedings, and laid on its table, July 9, 1789, a Declaration of Independence. He was soon appointed to the chief command of the armed citizens, whereupon he formed the National Guard and gave it the tricolor or cockade. Indeed, in the first stages of the Revolution it seemed as if the "Grandison-Cromwell-Lafayette" had the destinies of France in his hands. But the fever of revolution soon surged too hotly for the constitutional channels in which he would have had it flow. He struggled incessantly for order and humanity, yet was mortified to the heart by the furious violence of the mob which butchered Foulon and brandished the reeking heart of the commandant Berthier before his eyes. The Jacobins hated his moderation, while the court abhorred his reforming zeal, and both combined to defeat him in his canvass against Pétion for the mayoralty of Paris. Along with Bailly he founded the club of the Feuillants, and he supported the abolition of title as well as of all class privileges.

After the adoption of the constitution of 1790 he retired to his estate of Lagrange till he received the command of the army of Ardennes, with which he won the first victories at Philippeville, Maubeuge, and Florennes. But the hatred of the Jacobins increased, and at length Lafayette, who had gone from the army to Paris, publicly to denounce the Jacobin Club, finding on his return to the camp that he could not persuade his soldiers to march to Paris to save the constitution, rode over into the neutral territory of Liége. He was seized by the Austrians and imprisoned at Olmütz till Bonaparte obtained his liberation in 1797; but he took no part in public affairs during the ascendency of Bonaparte. He sat in the Chamber of Deputies from 1818 to 1824 as one of the extreme Left, and from 1825 to 1830 he was again a leader of the opposition. In 1830 he took

an active part in the revolution and commanded the National Guards. In 1824 he revisited the United States, by invitation of Congress, which voted him a grant of $200,000 and a township of land. He died in Paris, May 20, 1834. In 1898 the public school children in the United States contributed in small sums the funds for a statue of Lafayette, which was erected in Paris.

Lafayette College, an educational institution in Easton, Pa.; founded in 1832 under the auspices of the Presbyterian Church; has grounds and buildings valued at over $800,000; productive funds, over $780,000; scientific apparatus, etc., $180,000; volumes in the library, about 35,000; ordinary annual income, about $95,000; average number of faculty, 45; average student attendance, about 460; number of graduates, over 2,500.

La Fère (lä fâr), a fortified town of France, department of Aisne, on an island in the Oise, 14 miles N. W. of Laon. An arsenal and a school of artillery are located here.

Laffitte, Jacques (lä-fēt'), a French statesman; born in Bayonne, Oct. 24, 1767. He began life as a banker's clerk in Paris, and in 1805 began business on his own account. He soon acquired great wealth and in 1814 was made governor of the Bank of France. After the second restoration he joined the opposition in the Chamber of Deputies, and enjoyed the highest popularity in Paris; he was elected by all 20 sections in the city in 1817. In 1830 he made his house the headquarters of the friends of the revolution, and out of his private means supplied great part of the funds for carrying through the movement. In November he was intrusted with the formation of a cabinet, but he only held power till March 12 following. Meanwhile he was obliged to sell his property to pay his debts. A national subscription preserved him his hotel in Paris; and from the ruins of his fortune he founded a new Discount Bank in 1837. As the government receded from the principles of the revolution of 1830, Laffitte become more and more active in opposition. In 1843, to the great displeasure of the court, he was elected president of the Chamber of Deputies. He died in Paris, May 26, 1844.

Lafitte, Jean (lä-fēt'), an American buccaneer; born in France, 1780. He is first authentically known as the chief of an organized and formidable body of desperadoes having their headquarters on an island in Barataria Bay, about 40 miles W. of the delta of the Mississippi, in the Gulf of Mexico. Committing various piratical acts, the United States government sent out an expedition against them in

1814, which captured their stronghold and all vessels lying there at the time, but failed in making prisoners, Lafitte and his companions escaping to the swamps and bayous of the mainland. At the commencement of the war with the United States in 1814, Lafitte was offered by the British government $30,000, and a naval commission, to coöperate in their expedition against New Orleans. This offer he spurned, and communicating its nature to Governor Claiborne of Louisiana, he offered the services of himself and men against the enemy, on the sole condition of pardon for their past offenses. His offer was accepted, and Lafitte kept his word by rendering efficient aid to the Americans in the battle of Jan. 8, 1815. Lafitte was subsequently in Yucatan, where he is supposed to have died about 1826. He is the hero of a romance by the American novelist J. H. Ingraham.

Lafontaine, August Heinrich Julius (lä-fông-tān'), a German novelist; born in Brunswick, Oct. 5, 1758. He wrote more than 150 novels, and founded a school which in its day was regarded with high favor at the court of Prussia for its tone of illiberal moralizing sentimentality. Among his novels may be named: "Picture of the Human Heart" (1792); "Descriptions of the Life of Man" (1811); "The Parsonage on the Lake Side" (1816). He died in Halle, April 20, 1831.

La Fontaine, Jean de, one of the classics of French literature; born in Château-Thierry, Champagne, France, July 8, 1621.

LA FONTAINE.

He was about 22 years old when his literary ambition was awakened by the odes of Malherbe, from whose seriousness and dignity, however, he was soon diverted by the more congenial writings of Rabelais, Ariosto, Boccaccio, Horace, and Terence. One

of Cardinal Mazarin's nieces, being banished to Château-Thierry, admired his verses and carried him to Paris; and there, speedily welcomed into the best literary and aristocratic circles, he spent the last 35 years of his life. The first volume of his "Tales" appeared in 1664; a second was added in 1671. The 12 books of his "Fables" were published in equal parts in 1668 and 1678. It is through them that La Fontaine is universally known. He is an inimitable teller of small stories. His short flights of fancy, his minute strokes of observation, his transitions from brief moods of pathetic seriousness to flashes of the gayest wit, are all set off by a diction the most gracefully and delicately refined, and breaking out incessantly into felicitous turns of novel expression. La Fontaine's personal character, strange mixture of childish simplicity and finesse which is perceptible in his poems, made him at once the pet and the laughing-stock of his friends and patrons. To him might be applied, with little injustice, the epithet wrongly thrown on Goldsmith, of "an inspired idiot." During the last two years of his life the religious sentiments of his early youth revived, and he performed severe penances for such of his works as strict morality could not approve of. He was admitted to the French Academy in 1684, conjointly with his friend Boileau, and died in Paris, April 13, 1695.

La Fosse, or **Lafosse, Charles de** (lä fos), a French historical painter; born in Paris, France, June 15, 1640. He went to Rome and Venice in 1658 and spent three years in study. He was employed to decorate the cupola of the Church of the Invalides at Paris, the choir and dome of the Assumption, and a part of the palace at Versailles. Many of his pictures are seen in the royal palaces and museums, and engravings of them are numerous. He died in Paris, Dec. 13, 1716.

La Fourche (lä försh), a bayou in Southeastern Louisiana, an outlet of the Mississippi, which begins at Donaldsonville, on the right bank and flows S. E. to the Gulf of Mexico, with a total length of 150 miles. It is navigable by steamboats 100 miles from its mouth.

Lafuente, Modesto (lä-fwen'tā), a Spanish historian; born in Rabanel de los Caballeros in 1806. Under the pseudonym "Fray Gerundio" he published a series of satirical sketches which had wide circulation; but his principal work is a "General History of Spain" (30 vols. 1850–1866). It is written without partisanship, and is the fruit of laborious research; the style is excellent. He died in Rabanel de los Caballeros, Oct. 25, 1866.

Lagan (lā'gan), or **Ligan** (lī'-), in maritime law, goods found at such a distance from shore that it is uncertain what coast they would be carried to, and therefore belonging to the finder.

Lagarde, Paul Anton de (lä-gärd'), a German Orientalist; born in Berlin, Nov. 2, 1827. He became Professor of Oriental Languages at Göttingen, 1869. Of his very numerous writings the majority relate to the books of the Hebrew Scriptures; but he edited and commented on versions of those books and of the books of the New Testament in Greek, Armenian, Arabic, Syriac, Coptic, etc. He died in Göttingen, Dec. 22, 1891.

Lagenaria (laj-e-nā'ri-ä), in botany, a genus of *Cucurbitaceæ*, containing but one species, the bottle, club, or trumpet gourd (*L. vulgaris*). It is monœcious, with a campanulate calyx and a white corolla. It is wild in India, the Moluccas and Abyssinia. In that state it is poisonous, but when cultivated its deleterious properties disappear. Anglo-Indians boil the fruit when young and use it as vegetable marrow. Natives of India slice and eat it as a curry. The young shoots and leaves are also eaten. The fruit, which is sometimes six feet long, is often used by Indian beggars as a bottle. The seeds yield an oil which is used as an application in headaches. The flesh of the fruit is deemed to be diuretic, refrigerant and anti-bilious. It is bitter and purgative; it is occasionally used in India as a poultice, and applied to the shaved head in delirium. It is cultivated in the warmer parts of the Eastern Hemisphere.

Lagenorhynchus (la-je-nō-ring'kus), a genus of *Delphinidæ*. The beak of the upper jaw keeled on each side, the lower jaw with two or three small, conical, rudimentary teeth in the middle of each side. *L. leucopleurus*, the *Delphinus tursio* of Knox, occurs in Orkney and the Northern Ocean generally. *L. albirostris* is the white-beaked bottlenose. It has been taken on the coast of Norfolk, England.

Lager (lä'gur), or **Lager Beer.** The word "lager," in German, means a "storehouse," and has given name to a beer much brewed in Bavaria, and far more extensively in the United States, owing to the fact that in the former country it is stored in cool cellars or vaults for several months prior to use. In the United States, however, this last requisite is generally much curtailed. Ordinary beers are fermented at high temperatures, while lager owes its peculiar and highly prized properties to the comparatively slower kind of fermentation to which it is subjected. This is called "sedimentary" or "under fermenta-

tion," to distinguish it from other more rapid processes. See BREWING.

Lagerstromia (lag-ur-stru'mi-ä) (named after Magnus Lagerström, of Gothenburg), the typical genus of the tribe *Lagerstromieæ*. It consists of 14 East Indian and Chinese trees and shrubs, with splendid flowers. The calyx is cut into six lobes, the corolla has long claws, the stamens many, the fruit three or six-celled, with numerous seeds. *L. indica*, a shrub common in Indian gardens, has crumpled petals. It is from China. The flowers of *L. flos reginæ*, or *L. reginæ*, are in panicles, at first of a pale-rose color, but afterward deepening into a fine purple. It is a large, deciduous tree, growing in Eastern Bengal and Burma. Its bark and leaves are considered to be purgative and hydragogue, and the seeds to be narcotic. The timber is regarded in the E. of India and Burma as the most valuable of any except teak. It is used in the East for ship and boat building, making carts, gun carriages, etc. *L. lanceolata*, *L. microcarpa*, and *L. parviflora*, growing in India, *L. tomentosa* in Burma and Pegu, and *L. hypoleuca* in the Andaman Islands, have also valuable wood. *L. flos reginæ*, *L. parviflora*, and *L. tomentosa* yield gum resins. The bark of *L. parviflora* is used in India for tanning, and along with the bark of *Terminalia tomentosa* for dyeing skins black.

Lagides (laj'i-dēz), an Egyptian dynasty, the chief of which was Ptolemy, son of Lagus, a general of Alexander. It ruled in Egypt from the death of Alexander until the reduction of the country into a Roman province, 30 B. C., a period of 293 years.

Lago Maggiore (lä'gō mäd-jō're), (ancient Verbanus), a lake partly in Northern Italy, partly in Switzerland, surrounded by hills, and containing several islands; about 39 miles long and 7 broad, traversed by the Ticino; it is 621 feet above sea-level, and at the N. end in some places 2,500 feet deep. Its banks abound in every Alpine beauty, and are adorned with a number of picturesquely situated villages and towns. See BORROMEAN ISLANDS.

Lagomys, a genus of rodents, much resembling hares or rabbits, but with limbs of more equal length, more perfect clavicles, longer claws, longer head, shorter ears, and no tail. There are about a dozen species, one in S. E. Europe, one on the Rocky Mountains, and the rest on the mountains of Northern Asia. They are about the size of guinea pigs, and make burrows, but are particularly interesting for their habit of stacking choice herbage for winter use. The stacks of the Siberian species, the Alpine lagomys, or pika (*L. alpinus*), are said to be utilized by the sable-hunters for fodder.

Lagoon (lā-gön'), a shallow lake or sheet of water, connected with the sea or a river, found on the coasts of Holland, Italy, South America, etc. They sometimes are almost dried up in summer and become stagnant marshy pools. Also a sheet of water surrounded by an ATOLL (*q. v.*).

Lagophthalmia (lag-of-thal'mi-ä), a disease in which the eye cannot be closed. Sometimes it is a paralytic affection; but sometimes it depends on enlargement of the eye; it is also occasionally connate. The term has reference to the notion that hares sleep with their eyes open.

Lagopus (-ō'pus), ptarmigan, a genus of *Tetraonidæ* (grouse). The bill has the base thickly feathered, the eyebrows are naked and smooth, the tarsus and toes thickly covered with feathers in winter. *L. scoticus* is the red grouse. *L. Mutus*, or *vulgaris*, is the ptarmigan. *L. albus* is the willow grouse of the Swedish Peninsula, Russia, and Siberia.

Lagos (lä'gös), a seaport on the S. coast of Portugal, 30 miles E. N. E. from the extremity of Cape St. Vincent; pop. about 8,000; principal industry tunny and sardine fisheries. In the bay of Lagos Admiral Boscawen defeated the French Toulon fleet, Aug. 18, 1759.

Lagos (lā'gos), an island and strip of land in West Africa, formerly constituting a British colony and protectorate. By an Order in Council in 1906 the name of the colony was changed to Southern Nigeria, and the administration of the Southern Nigeria Protectorate was placed under that of the new colony, which is now known as the Colony and Protecorate of Southern Nigeria. Under this rearrangement the former colony and protectorate of Lagos now forms the western of three provinces of Southern Nigeria, with administrative headquarters at Lagos town. Area of former colony, 3,460; square miles; of former protectorate, 25,450 square miles; estimated pop. (1901), 1,500,000; pop. of Lagos town, 57,000.

Lagos Protectorate, a region in West Africa under the protection of Great Britain; bounded on the W. and N. by the French possessions, and on the E. by South Nigeria; area, over 25,000 square miles. Its limits have been modified by agreement with France and rearrangement of the British possessions on the Niger, and in 1901 the colony and protectorate were constituted the Lagos Territory.

Lagostomus, or **Lagostomys** (-gos'-), a genus of rodent mammalia, in which the forefeet are furnished with four toes, the hinder with three only, as in the cavies.

all of them armed with stout claws adapted for digging. The ears are of moderate size, and the tail comparatively short. Their three anterior molars of the upper jaw consist each of two double layers, and the last of three. The only known species, *L. trichodactylus*, is about the size of a hare, and inhabits Chile and Brazil; its general color is grayish; the fur of two sorts, one entirely white, and the other, which is coarser, black, except at the base; the under parts white. Its motions are quick, and resemble those of a rabbit; and it seeks its food by night, subsisting wholly on vegetables; it inhabits the level country, and is not esteemed as food. It has very generally obtained the name of viscacha; and it has also been figured in Griffith's edition of Cuvier's "Animal Kingdom" under the name of the Diana marmot.

Lagothrix (lag′-), a genus of South American monkeys, characterized by their round head, a thumb on the anterior hand (a characteristic which distinguishes them from the Ateles), and the tail partly naked. The Grison, or silver-haired monkey, is a species of this genius.

Lagrange, Joseph Louis (lä-gro*ngzh*′), a French mathematician; born in Turin, Jan. 25, 1736. While still a youth he solved for Euler the "isoperimetrical problem"; when Euler died, he succeeded him as director of the Berlin Academy (1766), and held that office till 1787. In the mean time he contributed to the proceedings of the Academy a long series of memoirs, and wrote his greatest work, "Analytical Mechanics." After the death of Frederick the Great he removed to Paris; there he was lodged in the Louvre, and a pension was settled on him equal to that granted by Frederick. He remained in France during the Revolution, safeguarded by the respect felt for his learning and his virtues even by the judges of the revolutionary tribunals. He died in Paris, April 10, 1813.

La Granja, or **San Ildefonso,** a small town of Spain, province of Segovia; 40 miles N. N. W. of Madrid; noted for its beautiful situation and its historical associations. Here Philip V. built a grand palace in imitation of Versailles; here he and his queen are buried; and here Maria Christina was forced in 1836 to restore the constitution of 1812.

La Guaira (lä gwī′rä), a city in Venezuela, on the Caribbean Sea. It was founded in 1588 and is now the most important place in the republic, commercially. Pop. (1901) est. 17,500.

La Guéronnière (lä gā-ro-nyār), **Louis Etienne Arthur Dubreuil Hélion, Vicomte de,** a French publicist; born in Limoges in 1816. He became a zealous partisan of Louis Napoleon after the coup d'etat of 1851, being then chief editor of the "Pays." In a celebrated pamphlet, "Napoleon III. and Italy," he first heralded the approaching war against Austria in Lombardy (1859). In another pamphlet, "France, Rome, and Italy" (1861), he brought again to the front the question of the Pope's temporal power. Hardly less celebrated than these were his pamphlets "Napoleon III. and England" (1858); "The Pope and the Congress" (1859). He died in Paris, Dec. 23, 1875.

Laguna (lä-gö′nä), a tribe of North American Indians numbering about 1,143, living in small pueblos in New Mexico on the Rio San José.

Laguna, La, a province of Luzon, Philippine Islands; area, including four dependent islands, 752 square miles; pop. (1903) 148,606; capital, Santa Cruz, at mouth of river of the same name; pop. 13,141. The province is mountainous, has numerous iron springs, and is exceedingly fertile. The inhabitants are all civilized and are Tagalogs.

Lagus, one of the heroes of classic history, a Macedonian by birth, who, having been married to Arsinoë, the mistress of Philip, and anxious to hide the consequences of his wife's former weakness, exposed her child, when born, in the woods. Having noticed an eagle feeding the infant, Lagus, struck with remorse, took back the child and reared him as his own giving him the name of Ptolemy. The child thus preserved became, on the death of Alexander, King of Egypt, under the name of Ptolemy Lagus, and was the founder of the dynasty of the Lagides (*q. v.*).

La Hague (lä häg), the N. W. extremity of the peninsula of Cotentin, in the N. of France, over against Alderney of the Channel Islands. It is crowned by a lighthouse, 158 feet high. This must not be confounded with La Hogue (*q. v.*).

La Harpe, Jean François de (lä ärp), a French writer; born in Paris, France, Nov. 20, 1739. He first attracted attention in 1763 by a successful tragedy, "Warwick." His fame was further enhanced by a series of eloquent "Eulogies," and the plays "Mélanie," "Philoctetes," and "Coriolanus" also were successful. His best known works are, however, his critical lectures, published in 12 vols. (1799–1805) as "Lycæum, or Course in Literature," which long remained a standard of literary criticism. His "Literary Correspondence," published in 1801, by the bitterness of its criticisms rekindled fierce controversies. The Revolution, at its com-

mencement, found no more ardent admirer than La Harpe; but after five months' imprisonment for refusing to countenance the extremes to which the immoderate zealots of the movement pushed matters his views changed, and he became a firm supporter of Church and crown. A posthumous work, "Cazotte's Vision," must be ranked among the best achievements of his pen. His graceful style and keenness of observation are perhaps more than counterbalanced by his partiality, vehemence of judgment, and superficiality. He died in Paris, Feb. 11, 1803.

Lahn, a river of Central Germany, which, after a W. course of 100 miles, empties into the Rhine near Lower Lahnstein.

La Hogue (lä hōg), a roadstead on the E. side of the peninsula of Cotentin, in the N. of France; not to be confounded with Cape La Hague. On May 19, 1692, the French fleet of 44 sail under Tourville, which Louis XIV. had collected for the purpose of invading England in support of James II., was defeated here by the combined English and Dutch fleets of 90 vessels under the Jacobite Admiral Russell. Twelve large French line-of-battle ships which took refuge in the shallow roadstead of La Hague were destroyed, under the eyes of King James, by boats' crews led by Admiral Rooke.

Lahore (lä-hōr′), a city of Hindustan, India; capital of the Punjab, and administrative headquarters of Lahore division and district, on the left bank of the Ravi, 265 miles N.W. of Delhi; it is surrounded by a brick wall 16 feet high, flanked by bastions; area, 640 acres. The streets are extremely narrow, unpaved, and dirty; and the houses have in general a mean appearance. The most remarkable buildings are the mosques of Aurengzebe, of Vizier Khan, and of Sonara; the mausoleum of Runjeet Singh, etc. The European quarter lies outside the walls on the S., and dates from 1849. Among the public buildings and institutions are the Punjab University, the Oriental College, Medical School, Law School, Mayo Hospital, etc. In 1524 Lahore became the seat of the Mogul empire, under which it reached its greatest splendor. Before passing into the hands of the British it was the capital of the Sikhs. Pop. (1901) 202,964. Also Lahore division; area, 24,872 square miles; pop. 5,466,644. Also Lahore district, the central district of Lahore division; area, 3,678 square miles; pop. 1,075,379.

Laidlaw, William, the friend and amanuensis of Sir Walter Scott; born in Blackhouse, Selkirkshire, Scotland, in November, 1780. After farming with but little success at Traquair and Libberton, he settled in 1817 as a kind of factor and manager on the estate of Abbotsford, and was Scott's trusted counselor in all his schemes of improvement. His acquaintance with Scott began in the autumn of 1802, and he supplied some of the materials for the third volume of the "Minstrelsy of the Scottish Border." The sweet and simple pathos of his own ballad, "Lucy's Flittin," would alone have kept the name of "Willie" Laidlaw from being forgotten even were that name not safely enshrined in 100 pages of Lockhart's "Life of Scott." After his great master's death Laidlaw was factor successively on two Ross-shire estates, and died at his brother's farm at Contin in that county, May 18, 1845.

L'Aine, Bertin. See BERTIN, LOUIS FRANÇOIS.

Laing, Alexander Gordon, a British African traveler; born in Edinburgh, Dec. 27, 1793. After serving in the army and attaining the rank of major, he entered in 1822 on his career as an African traveler. The results of his early journeys in West Africa were published in 1825. He explored the upper course of the Niger, and was assassinated by his guide near Timbuctoo, Sept. 26, 1826.

Laing, Malcolm, a Scotch historian; born on the mainland of Orkney, in 1762. He was educated at Kirkwall and Edinburgh University, and was called to the bar in 1785. He wrote in 1793 the last volume of Henry's "History of Great Britain," and in 1800 published his own "History of Scotland from James VI. to Anne." In a dissertation in the 1804 edition occurs his well-known attack on Queen Mary for participation in the murder of Darnley. Laing also edited the poems of "Ossian." He died in November, 1818.

Lais (lā′is), the name of one or more, probably two, Greek ladies, more celebrated for the matchless beauty of their persons than for the rectitude of their morals. The elder is believed to have been born in Corinth, and flourished during the Peloponnesian war. The younger appears to have been born in Sicily, but came to Corinth when still a child. She sat as a model to the painter Apelles, and was stoned to death by some Thessalian women whom she had made jealous. Both of these women had temples erected to their memory.

Laissez Faire (lā-sā′fār), a term applied to that manner of conducting a government in which the people are allowed to regulate themselves with as little interference from the supreme authority as possible.

Laistner, Ludwig (līst′ner), a German poet; born in Esslingen, Nov. 3, 1845. Among his works are: "Barbarossa's Mar-

riage-Broker" (1875), an epic poem; "Cloud-Myths" (1879), relating to German mythology; "The Sphinx's Riddle: Elements of a History of Mythology" (2 vols. 1889); "Germanic Names of Peoples" (1892).

Laius (lā'yus), in Greek legend, the son of Labdacus. He succeeded his grandfather Myeteus on the throne of Thebes, when he married Jocasta, the daughter of Creon, King of Corinth. The oracle having declared that he would be killed by the hand of his own son, he had his first child Œdipus exposed, but the man intrusted with this deed repented, and he was privately reared by a peasant. Many years afterward, when the boy had grown to man's estate, he met his father in a narrow lane; Laius haughtily ordering the youth to make room, the latter refused, and, being ignorant of the dignity or relationship of the person he addressed, drew his sword, and in the scuffle that ensued killed his father. See JOCASTA: ŒDIPUS.

Lake, a large sheet or expanse of water entirely surrounded by land, and having no direct or immediate communication with any sea, ocean, or river, or having communication only by means of rivers. The largest fresh-water lake on the globe is Lake Superior, in North America. It is 400 miles long, 160 miles wide at its greatest breadth, and has an area of 32,000 square miles. As Professor (now Sir Andrew) Ramsay first pointed out in 1862, many lakes are of glacial origin, an hypothesis illustrated by the fact that on a map of the world it is chiefly N. lands like Scotland, Scandinavia, or the more Arctic parts of Russia, North America, and mountain-lands like Switzerland and the N. of Italy that are characterized by the presence of lakes. Others are of volcanic or earthquake origin.

Lake District, the name applied to the picturesque and mountainous region in England comprised within the counties of Cumberland, Westmoreland, and a small portion of Lancashire, within which are grouped as many as 16 lakes or "meres," besides innumerable mountain "tarns" and streams, and a series of mountains rising in four points to a height of over 3,000 feet. The district extends about 30 miles from N. to S. by about 25 from E. to W., and contains within its compass the utmost variety and wealth of natural scenery, soft and graceful beauty ever alternating closely with grandeur and sublimity. It is visited every year by thousands of tourists. The principal lakes are Windermere, Esthwaite Water, and Coniston in the S.; Ullswater and Hawes Water in the E.; Bassenthwaite in the N.; Wast Water, Ennerdale Water, Buttermere, and Crummock Water in the W.; and Derwentwater, Thirlmere, Grasmere, and Rydal Water in the heart of the district.

But far more even than its romantic natural beauty, is the rare interest that has been added to this district by the group of illustrious poets who made it their home about the beginning of the 19th century, and who were somewhat unintelligently grouped together by unsympathetic critics as forming the "Lake School" of poetry. Of these the most illustrious was Wordsworth. His "Excursion" is the best of all guide-books to the Lakes — "Wordsworthshire," as Lowell aptly terms the district; and students of English poetry will never lose an interest in those hallowed scenes in which the modern high priest of Nature first expounded the coöperative spiritual harmony between man and nature herself, and taught how the mute life in nature ever leads upward to the conscious life in man and the creative force in God. Wordsworth lies fittingly, with his wife, his children, and his gifted sister Dorothy, in Grasmere churchyard, in the midst of the scenery he has made enchanted. His first house at Grasmere, Dove Cottage or Town End, his home from December, 1799, to May, 1808, and of De Quincey for more than 20 years thereafter, was bought in 1890 by public subscription for permanent preservation as a memorial of Wordsworth. His life-long friend and brother-poet, Southey, lived for 40 years at Greta Hall, near Keswick, and rests in Crosthwaite churchyard hard by. Here also at Greta Hall Coleridge lived awhile, often visiting the Wordsworths; and here his children were brought up by Southey. The hapless Hartley Coleridge lived long at Nab Cottage, near Rydal Water, and is buried beside Wordsworth in Grasmere. Christopher North lived at Elleray, near Windermere; Shelley lived some time at Keswick after his marriage, and Mrs. Hemans at Dove Nest on Windermere. Harriet Martineau had her home at the Knoll, near Ambleside; and not far off is Fox How, where Dr. Arnold found rest from the strain of Rugby, and where he died. James Spedding was born at Bassenthwaite, and here was visited by Edward Fitzgerald and Tennyson; and the latter lived some time at Tent House on the E. bank of Coniston Lake. At Brantwood, near Coniston Lake, Ruskin resided during the later years of his life. The poet Gray spent a fortnight of 1769 in traversing the Lake District. Hither came in the summer of 1802 Charles Lamb, with his sister Mary, to spend three weeks with Coleridge at Keswick. He appears to have thoroughly enjoyed the new experiences.

Lake Dwellings, in anthropology, the *Pfahlbauten* of German, the *habitations lacustrines* of French writers. The earliest

account of similar dwellings is to be found in Herodotus, who describes a Thracian tribe living, in 520 B. C., in a small mountain lake of what is now Rumelia. The custom of constructing these habitations has come down to the present day. The fishermen of Lake Prasias, near Salonica, still inhabit wooden cottages built over the water, as the Thracian tribes did, and in the East Indies the practise of building lake settlements is very common.

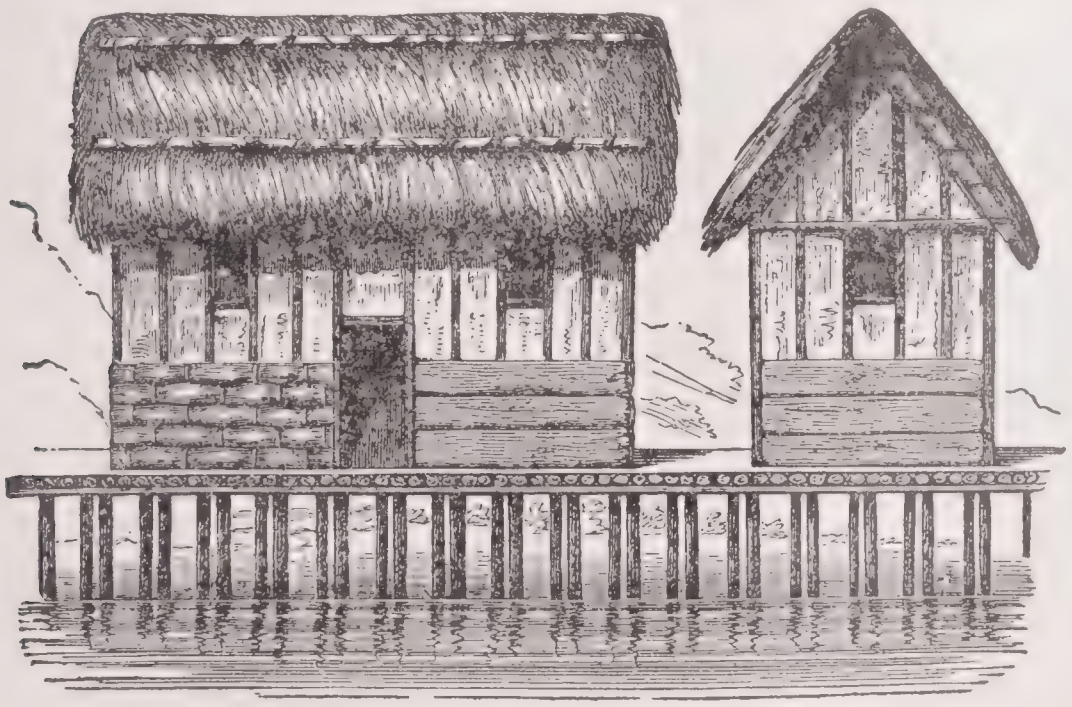
The lake dwellings proper of Switzerland came to light during the winter months of 1853–1854, when the water of the lakes fell much below its ordinary level. Dr. Keller, who first described these lake dwellings, says that the main platform was made of round timbers, rarely of split boards, covered with a bed of mud; the walls and sides were in great measure of interlaced branches, the interstices filled with moss, and daubed with clay. In his opinion, all the evidence goes to show they were rectangular in shape. It is probable that the huts were thatched, and the parts used as dormitories strewn with straw or hay. M. Troyon ("On Lake Dwellings") thinks they were round, as were the huts of many nations on the shore. It has not been ascertained whether the huts were divided into rooms, or whether they contained a single chamber. Keller ("Lake Dwellings of Switzerland") distinguishes three modes of construction:

(1) *Pile.*—The platform laid on piles driven into the mud at regular intervals, the spaces between the piles being filled up with stones, to give solidity to the structure. Keller's translator notes that a somewhat similar process was adopted at Portland breakwater.

(2) *Frame Piles.*—A comparatively rare form, known to have existed in the Lake of Zurich, and possibly in other places. The piles to support the platform were fixed by a mortise and tenon arrangement into split trunks, lying horizontally on the bottom of the lake. This plan was chiefly followed where the bottom of the lake was of soft sand, giving no hold for the piles. Timbers are known to be at the bottom of several of the Swiss lakes, so that this mode of construction may have been widely spread.

(3) *Fascine.*—Here the necessary foundation for the platform was obtained by layers of sticks, or the stems of small trees.

Also, artificial islands found principally in Ireland, where they served the purpose of strongholds. In this case "the support consisted not of piles only, but of a solid mass of mud, stones, etc., with layers of horizontal and perpendicular stakes, the latter serving less as a support than to bind the mass firmly together." They are of much later date than the lake dwelling proper, some being depicted in Johnson's "Platt of the County Monaghan," a map of the escheated territories made for the English government in 1591.



LAKE DWELLINGS.

Lake Forest University, a co-educational Presbyterian institution at Lake Forest, Ill.; founded as Lind University in 1856; name changed to the present in 1865; college opened in 1876; has grounds and buildings valued at over $900,000; productive funds, over $700,000; volumes in the library, about 30,000; ordinary income, about $170,000; faculty, 50; students, 420.

Lake George of New Jersey, The, Lake Hopatcong, in Sussex county.

Lake of Gennesaret. See GALILEE, SEA OF.

Lake of Lot, The, the Arabic name for the Dead Sea.

Lake of the Four Forest Cantons, another name for the Lake of Lucerne. The city of Lucerne, and the towns of Küsnacht, Brunnen, and Flüelen are on its shores.

Lake of the Thousand Islands, an expansion of the ST. LAWRENCE (*q. v.*) extending about 40 miles below Lake Ontario. It contains about 1,500 rocky islets, the largest, Wolfe Island (48 square miles; pop. 2,383), measuring 21 miles by 7.

Lake of the Woods, a large lake of North America, studded with numerous wooded islands; lat. 49° N., lon. 95° W.; length nearly 100 miles, circuit about 300 miles. It is mostly in Ontario, but extends also into Manitoba and Minnesota. It is fed by the Rainy river, and drained by the Winnipeg.

Lake Poets, See LAKE DISTRICT.

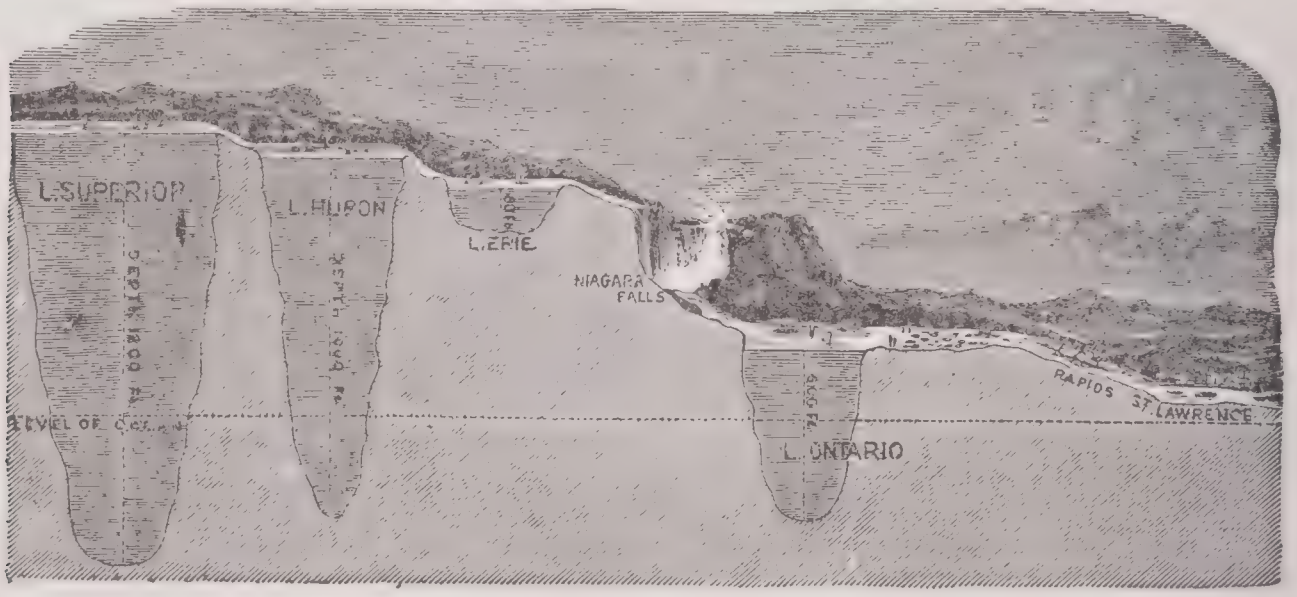
Lakes (originally prepared from lac, whence the name) pigments or colors formed by precipitating animal or vegetable coloring matters from their solutions chiefly with alumina or oxide of tin. Cochineal and madder lakes are the only ones used by artists. The former are prepared with COCHINEAL (*q. v.*) and alumina, and according to their shade of red, or purple red, are known as carmine, crimson lake, scarlet lake, purple lake, and Florentine lake. These were formerly much employed for landscape work by water color painters, and are still in request for flower painting, but they have not much stability. The madder pigments of this kind, called rose madder or madder lake and madder carmine, are on the other hand quite permanent, both as water colors and oil colors, and are much prized by artists. There are several yellow lakes made, but they are fugitive, and consequently but little used. Paper-stainers and decorators use several pink lakes prepared by saturating a strong decoction of Brazil-wood and other dyewoods with chalk, starch, and a little alum. To these such names as Venetian, Florence, and Berlin lakes are applied. The two best lakes used by decorators are crimson and morone lakes.

Lakes, Queen City of the. See QUEEN CITY OF THE LAKES.

Lake School, a name applied in derision by the "Edinburgh Review" to a class of poets who, following the example of Wordsworth, Southey, and Coleridge, the founders of the school (who resided for a considerable part of their lives near the lakes of Cumberland and Westmoreland), substituted a simple and natural taste for the stiff classicism of the 18th century. See LAKE DISTRICT.

Lake State, The, a name given to Michigan. Its shores are watered by Lakes Superior, Michigan, Huron, and Erie. The Indian word Michigan signifies "great lake."

Lake Survey, a complete survey of the American shores of the great lakes — Superior, Michigan, Huron, Erie, and Ontario — rendered necessary by the proximity in which vessels are at all times. It was commenced with an appropriation by Congress of $15,000 in 1841, carried on under the direction of the Chief Engineer U. S. A., and completed in 1870. The developed line is 4,700 miles in length. Various points were developed during the survey, among them the existence of solar and lunar tides in Lakes Michigan and Erie, the heights of the lakes above the sea, and their fluctuations. Also determinations in the magnetic elements were made at various points. The following are their dimensions and elevations:



COMPARATIVE DEPTH AND ELEVATION OF GREAT LAKES.

LAKES.	Greatest length, miles.	Greatest width.	Elevation, feet.	Area, sq. m.
Superior	438	166	620	33,000
Michigan	364	110	590	24,000
Huron	300	163	578	21,000
Erie	235	81	560	8,000
Ontario	184	65	264	6,500
T'l l'gth of all...	1,521			

Lake Worship, a particular kind of water worship noticed by Sir John Lubbock ("Prehistoric Times," p. 269) to refute a theory that the gold ornaments dredged up from the sites of lake dwellings were offerings to the gods. That certain lakes were held sacred by ancient nations is indisputable.

Lakhnauti. See GAUR.

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